CASTLE MOUNTAIN PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA

DRAFT
ENVIRONMENTAL IMPACT STATEMENT/ ENVIRONMENTAL IMPACT REPORT
State Clearinghouse No. 88062708

FEBRUARY 1989

Prepared for:

Bureau of Land Management
Needles Resource Area
Needles, California

County of San Bernardino
Environmental Public Works Agency
San Bernardino, California

Applicant:

Viceroy Gold Corporation
Las Vegas, Nevada

Prepared by:

Environmental Solutions, Inc.
Irvine, California

Cover: James Hart, Clark Hitt and Bert Hitt discovered gold in the Castle Mountains on December 19, 1907. This discovery subsequently led to formation of the Hart Mining District.

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

CALIFORNIA DESERT DISTRICT
1695 Spruce Street
Riverside, California 92507

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

IN REPLY REFER TO:

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(CA-069.05)

MAR 06 1989

Dear Reviewer:

Enclosed for your review and comment is the Draft Environmental Impact Statement/Environmental Impact Report (DEIS/EIR) for the proposed Castle Mountain Mine. The purpose of the document is to outline in advance the probable environmental and social impacts that would be caused by a proposed open pit, heap leach gold mine in the Castle Mountains, located near the Nevada border in northeastern San Bernardino County.

To facilitate review, the document has been prepared to meet both Federal and State requirements of the National Environmental Policy Act and California Environmental Quality Act, respectively. The DEIS/EIR has been prepared by Environmental Solutions, Inc. of Irvine, California under the direction of the Bureau of Land Management and San Bernardino County.

Three public hearings will be held in Southern California and Nevada to allow you an opportunity to provide oral comments on the adequacy, completeness, or accuracy of the DEIS/EIR:

Date	Location
April 18, 1989 7:00 p.m.	San Bernardino County Government Center 1st floor hearing room 385 North Arrowhead Avenue San Bernardino, California
April 19, 1989 7:00 p.m.	Barstow Station Inn 1511 East Main Street Barstow, California
April 20, 1989 7:00 p.m.	Clark County Education Center 2832 Flamingo Road Las Vegas, Nevada

Written comments will be accepted through May 15, 1989, and should be addressed to:

Needles Resource Area
Post Office Box 888
Needles, CA 92363-0888
ATTN: John Bailey

We appreciate your interest in your public lands and your commitment to participating in this review process.

Sincerely,

Gerald E. Hiller

Gerald E. Hiller
District Manager

*Take pride in your California Desert Conservation Area . . .
A National Treasure.*

CASTLE MOUNTAIN PROJECT
SAN BERNARDINO COUNTY, CALIFORNIA

DRAFT EIS/EIR

State Clearinghouse No. 880622708

Abstract:

The Castle Mountain Project is a proposed open pit heap leach gold mine located in the Hart Mining District of Lanfair Valley in northeastern San Bernardino County, California. Lanfair Valley is located in the East Mojave National Scenic Area of the California Desert Conservation Area. The project site is comprised of about 2,735 acres of both Federal and patented lands. The operation would use conventional heap leach processing to recover gold in a disseminated orebody. Ore would be processed at a rate of about three million tons per year for approximately ten years. At project completion, about 890 acres of the site would be disturbed. Issues identified through the public scoping process and evaluated in this document include geology, water, vegetation, wildlife, air quality, health and safety, visual resources, cultural resources, land use, socioeconomics, and infrastructure. Potential adverse impacts to the environment would be mitigated below a level of significance through regulatory requirements and through measures incorporated in project planning and design.

Actions Required:

Bureau of Land Management: Plan of Operations
County of San Bernardino: Site Approval and Mining Reclamation Plan Review

Comments on this Draft EIS/EIR must be submitted to BLM at the address below no later than 5:00 p.m., May 15, 1989 to be considered in the Final EIS/EIR. For further information, contact BLM or the County at:

U.S. Bureau of Land Management
Needles Resource Area
101 West Spike's Road/P.O. Box 888
Needles, California 92363
Attention: John Bailey

County of San Bernardino
Environmental Public Works Agency
385 N. Arrowhead Avenue, 3rd Floor
San Bernardino, California 92415
Attention: Joe Bellandi

Applicant:

Viceroy Gold Corporation
9457 South Las Vegas Boulevard
Las Vegas, Nevada 89123

Prepared by:

Environmental Solutions, Inc.
15520 Rockfield Boulevard, Suite D
Irvine, California 92718

This document has been prepared by Environmental Solutions, Inc., an independent consulting firm, under the direction of the U.S. Bureau of Land Management and County of San Bernardino. A disclosure statement indicating that Environmental Solutions, Inc. has no financial or other interest in the Castle Mountain Project has been filed with BLM in accordance with Federal regulation 40 CFR 1506.5(c).

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CHAPTER 1.0
SUMMARY

1.0 SUMMARY

1.1 INTRODUCTION

1. This document has been prepared in accordance with National Environmental Policy Act (NEPA) regulations and California Environmental Quality Act (CEQA) guidelines for use by the U.S. Bureau of Land Management (BLM) and the County of San Bernardino in consideration of approvals to permit construction and operation of the Castle Mountain Project, a proposed open pit heap leach mining project. The project would be located in the Castle Mountains of San Bernardino County, California, as shown in Figure 1.1.1, Castle Mountain Project Location Map.

2. The following sections provide a brief summary of the proposed project and the major conclusions of issues analyzed in this document. Detailed discussions of the material summarized in this chapter are presented in other parts of this document as follows:

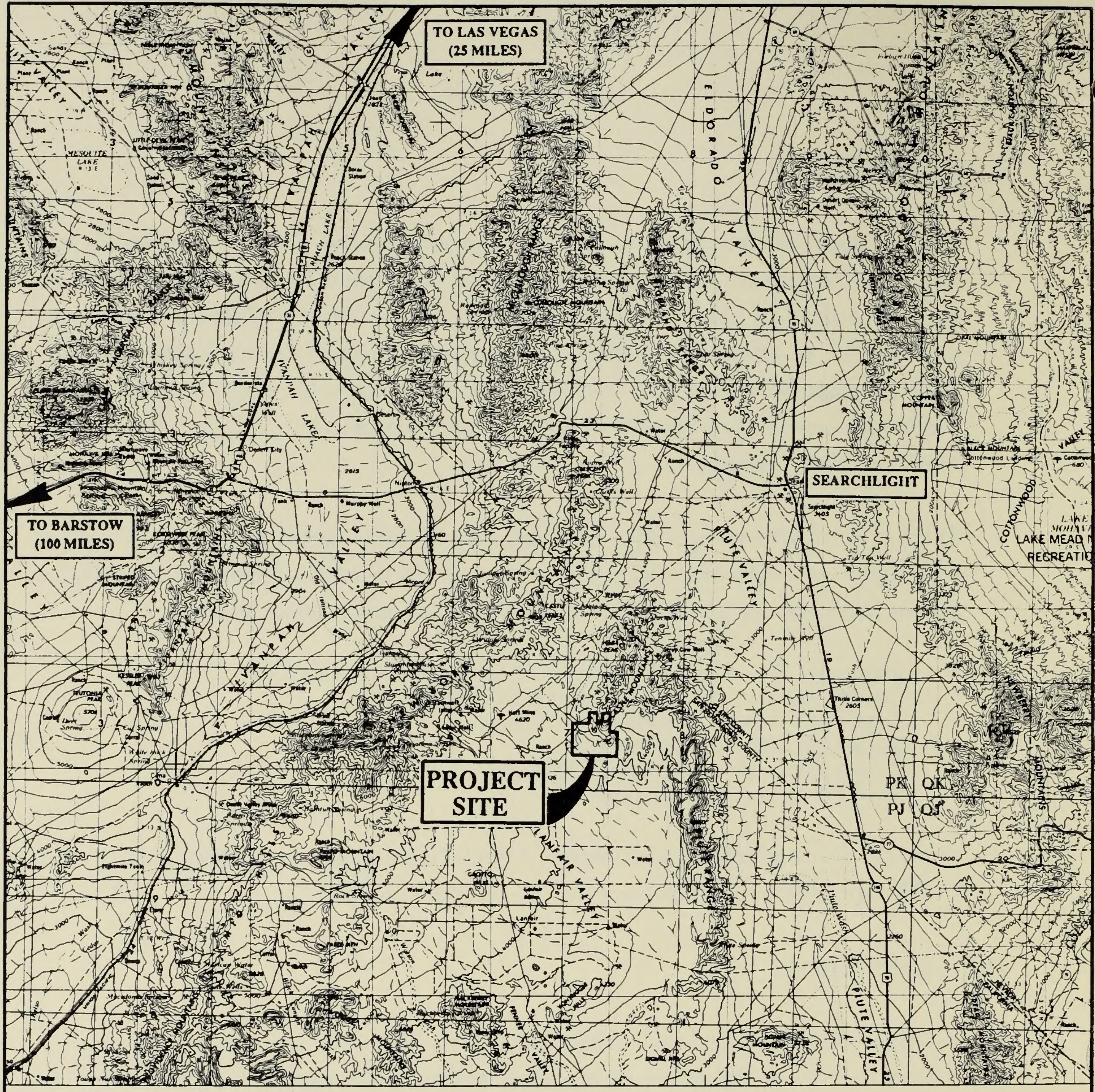
   - Chapter 3.0, Description of the Proposed Action and Its Alternatives
   - Chapter 4.0, Description of the Existing Environment
   - Chapter 5.0, Potential Environmental Impacts
   - Chapter 6.0, Mitigation Measures
   - Chapter 7.0, Unavoidable Adverse Impacts
   - Chapter 8.0, Cumulative Impacts

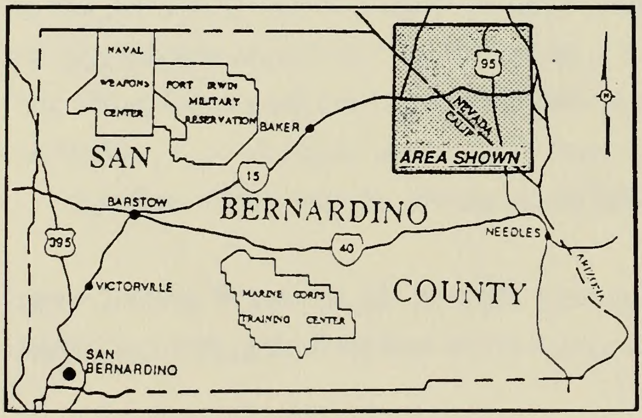
   While this summary chapter is presented for purposes of convenience pursuant to NEPA and CEQA, the reader is encouraged to review the supporting analyses.

Public Scoping Process

1. A public scoping process was initiated by BLM and the County to identify the range of actions, alternatives, significant effects, and mitigation measures to be analyzed in depth in this Draft Environmental Impact Statement/Environmental Impact Report (EIS/EIR), and to eliminate from detailed study issues found not to be important. The process was designed to provide opportunity for receipt of verbal and written comments from the general public and from local, State, and Federal government agencies. This was achieved through publication and direct mailing of notices, notification of local media sources, and two public meetings.

2. The primary issues of concern were employment impacts, the impact of ground water withdrawal on the Lanfair Valley aquifer and its relationship to Piute Spring, potential impact





REFERENCE: U.S.G.S. TOPOGRAPHIC MAP OF KINGMAN, ARIZONA-NEVADA-CALIFORNIA, 1954, REVISED 1969

FIGURE 1.1.1

CASTLE MOUNTAIN PROJECT LOCATION MAP

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 2/21/89

of project operations on wildlife and its habitat, reclamation of disturbed vegetation, use of hazardous materials, conformance with visual management objectives, and land use designations and future use considerations, including recreation.

As a result of the scoping process, the following topics were identified as potential issues and evaluated in detail in the Draft EIS/EIR:

- Geology (including minerals and paleontology)
- Water Resources
- Vegetation
- Wildlife
- Air Quality
- Environmental Health and Safety
- Visual Resources
- Cultural Resources
- Land Use
- Socioeconomics
- Infrastructure

Issues to be Resolved

1. This discussion is designed to identify the main issues surrounding aspects of the proposed project for which a decision has not yet been made. For the Castle Mountain Project, rights-of-way would be needed for access and for water and power distribution lines. The BLM exercises discretionary powers for rights-of-way approvals, in accordance with the Federal Land Policy Management Act (FLPMA). Preliminary locations for water and power distribution facilities are presented in this document. Final locations for these facilities would be determined by BLM.

2. The primary issue to be resolved is the choice among two alternatives for access right-of-way. This issue was raised during the public scoping process, when use of a proposed Searchlight Access Route between U.S. Highway 95 at Searchlight, Nevada was questioned because of concern for potential impact to the Piute Valley desert tortoise population and for potential increased off-road vehicle access from that direction to Lanfair Valley. Because of these concerns, an alternative was developed that would not involve use of the Searchlight Access Route. Known as the Ivanpah Access Route Alternative, it would effectively direct project traffic to a northwesterly access route and avoid Piute Valley. The proposed action and this alternative are both evaluated for potential environmental impacts throughout this document. The resolution to this issue will be determined by BLM based, in part, on this document.

1.2 PROPOSED ACTION

1. The proposed action is located in an area of the Castle Mountains known as the Hart Mining District. Mining was first established here in the early 1900s when a short-lived gold rush occurred. Periodic gold mining has occurred since that time. Two pits at the site are now mined for fine clays. An exploration program initiated by the Applicant in 1983 resulted in the discovery of disseminated gold orebodies of commercial value. A proposed Plan of Operations for mining and processing was submitted for BLM consideration, and a Mining Reclamation Plan and Site Plan were submitted to the County. The 2,735-acre site encompasses about 2,620 acres of Federal land and 115 acres of patented mining claims.

2. The project would operate as an open pit heap leach mine, using established methods common to the industry. Overburden would be removed to expose the orebodies. Ore would be excavated, crushed to the size of gravel, and deposited in heap piles on impervious liners for leaching. A dilute solution of sodium or calcium cyanide would be percolated through the heap, dissolving gold and silver. The gold-bearing solution would be drained from the heap leach pads and stored in ponds for processing in a gold recovery plant. This plant would remove the gold and silver from solution, using a carbon adsorption process, and return the "barren" solution to a holding pond for reuse at the heap leach pads. In this manner, solution is recycled with no discharge to the environment. The Castle Mountain Project would operate for about 10 years and process about three million tons of ore per year.

3. Major components of the proposed project would include the mine pits, overburden pile, crushing and ore transport facilities, heap leach pads, solution storage ponds, gold processing plant, and soil storage areas. Other components would include utilities (water, power, waste disposal, and communications), miscellaneous structures (including an administration/laboratory building and mine shop), and roads. Power would initially be provided by onsite generators using both diesel and propane fuels. A natural gas transmission line would later be extended along the Searchlight Access Route and propane-fired generators converted for this fuel. About 450 gpm of water would be required, primarily for ore processing and dust control. This would be supplied from about 10 wells in an area known as the West Well Field, located about 12,000 feet northwest of the project site. Construction and operation of onsite facilities would ultimately disturb about 890 acres, or about 35 percent of the 2,735-acre site.

4. The project site is located in a relatively remote area. As such, two access routes have been planned to provide convenient ingress/egress for commuting employees and deliveries of equipment and supplies. Both access routes would require upgrading and maintenance to accommodate daily project traffic. From the northwest, the Ivanpah Access Route would use existing paved and upgraded dirt roads for access from Interstate 15. It is expected that this route would be primarily used for deliveries of equipment and supplies. From the northeast, the Searchlight Access Route would use upgraded dirt roads (both existing and improved by the project Applicant) for access from U.S. Highway 95 at Searchlight. About 20 acres of disturbance would be involved for improvements that include about three miles of new road construction. It is expected that this route would be primarily used for access by employees. The Applicant has proposed a program of project-sponsored bus/van pooling to reduce total traffic by about 70 percent.

1.3 ALTERNATIVES TO THE PROPOSED ACTION

1. Several alternatives to various aspects of the proposed action were considered during the preliminary project design phase and preparation of this document, including:

   - Alternative Mining and Processing Technologies
   - Alternative Locations for Project Facilities
   - Alternative Water Supply
   - Alternative Power Supply
   - Alternative Access (Ivanpah Access Route)
   - No Action Alternative

   The first four of these alternatives were found inappropriate for the ore type or processing procedures, or would not reduce or eliminate an impact of the proposed action and thus offered no environmental advantage. The Ivanpah Access Route Alternative was found to be feasible and would reduce some potential impacts. This alternative is evaluated for potential impacts in the text. In addition, the No Action Alternative is evaluated, as required by both NEPA and CEQA guidelines.

Ivanpah Access Route Alternative

1. This alternative is a variation of the proposed action. It would involve implementation of the Castle Mountain Project, but no access improvements would be completed along the Searchlight Access Route, and the potential for project traffic on that route would be limited. Nearly all project traffic would use the Ivanpah Access Route. The proposed natural gas pipeline would still be constructed along existing roads in the vicinity of the Searchlight Access Route alignment, subject to FLPMA right-of-way requirements.

2. The primary project change with this alternative would be a redistribution of project traffic and increased travel time to the site, as compared to the proposed action using the Searchlight Access Route. An additional 30 minutes or more would be added to commute time for employees living in communities along U.S. Highway 95. This would discourage employees from living in communities such as Boulder City, east Henderson, and Laughlin, since travel times would approach two hours.

No Action Alternative

1. Consideration of the No Action Alternative is required by both NEPA and CEQA. However, because mining operations are authorized on Federal lands, this alternative could only be implemented if the proposed action were to result in "unnecessary or undue degradation." If this alternative were implemented, the site would not be developed under the proposal analyzed in this document, and no potential for increased environmental impacts would occur.

1.4 ENVIRONMENTAL SETTING

1. Lanfair Valley lies in the eastern Mojave Desert of California. The Valley is similar to other valleys in the eastern Mojave Desert, with alluvial flatlands surrounded by sloping bajadas and mountains. Lanfair Valley is elevated above the surrounding Ivanpah, Piute, and Fenner Valleys and as such receives somewhat greater rainfall. Elevations range from about 3,200 feet at the southeastern limits of the Valley to over 7,500 feet in the New York Mountains. Elevations at the project site range from about 4,100 to 5,100 feet.

2. Vegetation and wildlife species in the region are generally wide-ranging and are commonly found throughout the Mojave Desert. Representative plant communities include pinyon/ juniper woodland, blackbush scrub, Joshua tree woodland, and creosote bush scrub. An

understory of desert grassland occurs throughout the floor of Lanfair Valley covering about 200,000 acres and recognized as an unusual plant assemblage (UPA) by BLM. Wildlife at the project site is typical of Lanfair Valley and includes reptiles such as lizards and snakes, various resident and migratory birds, and mammals, including coyote, jackrabbit, desert woodrat, and mice. Species of special interest include raptors such as the golden eagle, prairie falcon, and Swainson's hawk. Desert bighorn sheep occur in mountains surrounding the Valley. The desert tortoise is expected to occur in limited numbers in Lanfair Valley. Large populations are known to exist in the lower elevation of Ivanpah and Piute Valleys.

3. Land use in Lanfair Valley and at the project site has historically been linked to mining and grazing activities. Mining has occurred throughout the Valley, but the greatest past and present activities are related to the Hart Mining District of the Castle Mountains, where gold and fine kaolin clay are found on and in the vicinity of the project site. Cattle graze Lanfair Valley and adjacent areas on extensive private lands and BLM grazing allotments. The East Mojave National Scenic Area extends over this region of the Mojave Desert, including Lanfair Valley, and there are designated wilderness study areas in the surrounding mountain ranges. Some of these areas are recommended by BLM for inclusion in the wilderness preservation system, to be considered by Congress. Recreational uses are generally passive, such as sightseeing along the Mojave Road or the East Mojave Heritage Trail.

4. From the proposed project site, the proposed Searchlight Access Route follows alluvial basins in northern Lanfair Valley to the alignment of the former Barnwell and Searchlight Railway. The easterly 9.5 miles of this route has been graded and is a County-maintained roadway (Clark County Road A68P). The western portion, which leads to Lanfair Valley, has been established by use and is not maintained. The eastern portion of Clark County Road A68P (near Searchlight) passes through low to medium density Piute Valley crucial desert tortoise habitat.

5. The Ivanpah Access Route traverses the floor of Lanfair Valley, passes through the New York Mountains, and crosses Ivanpah Valley to connect with the Nipton-Moore Road near Interstate 15. The westerly 10.9 miles of this road is paved and maintained by the County of San Bernardino. The easterly portion is an upgraded dirt road which is periodically graded and maintained by the Applicant and others. The western portion of Ivanpah Road passes through low to high density Ivanpah Valley crucial desert tortoise habitat.

1.5 SUMMARY OF POTENTIAL ENVIRONMENTAL EFFECTS

1. Anticipated environmental effects of the proposed action and its alternative are evaluated in Chapter 5.0, Potential Environmental Impacts. Potential effects of the proposed action and its alternative were evaluated according to criteria for significance established at the beginning of each section. Measures to reduce the identified effects are proposed in Chapter 6.0, Mitigation Measures. These potential impacts and mitigation measures are summarized for each environmental topic in Table 1.1.1, Summary of Potential Effects and Mitigation Measures. This table outlines the major findings and conclusions of the evaluations for significant impacts. Based upon the potential impacts identified and mitigation measures incorporated, it was found that the environmental effects of the project could be reduced below a level of significance.

2. The primary difference in potential environmental impact with the Ivanpah Access Route Alternative would be a reduction in the number of acres of vegetation and wildlife habitat disturbed (about 20 acres or about two percent less than the proposed action), and a reduction in potential traffic impacts to the low to medium density Piute Valley desert tortoise population. However, this alternative would direct nearly all traffic through Ivanpah Valley, with an increase in potential impacts to the low to high density Ivanpah Valley desert tortoise population.

1.6 SUMMARY OF POTENTIAL CUMULATIVE IMPACTS

1. A cumulative impact is the effect on the environment which results from the incremental impact of a proposed action when combined with the effects of other past, present and reasonably foreseeable future actions. Past and present conditions were considered in this document throughout the analyses of existing conditions and potential impacts of the proposed project. An evaluation of the future potential for the Castle Mountain Project to contribute to a significant cumulative impact was completed for other reasonably foreseeable future activities in the area as identified through contact with BLM and County offices.

2. Other foreseeable activities in the area include upgrading or extension of power, waste disposal, and transportation services, limited residential development, ongoing casual and active recreation uses, mineral exploration and related mining potential, and grazing. The

major potential cumulative effects of these activities are generally anticipated to involve water availability, disturbances to vegetation and wildlife habitat, air quality, visual resources and land use.

3. Because other activities within the cumulative impact study area are generally isolated from each other and from the proposed Castle Mountain Project either by distance or intervening topography, the potential for a cumulative impact on most of these resource categories is minor. Based upon these considerations, and the mitigation measures that would be applied to the proposed project and future projects to cover the range of impacts anticipated, the effects of other existing and reasonably foreseeable activities and the proposed action would not significantly affect an environmental resource or the continuation of existing land uses.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
GEOLOGY		
1. Potential ground motion from earthquakes could pose a hazard to project facilities.	1.1 Structures and facilities shall meet current applicable seismic safety standards.	1. Not significant.
	1.2 Facilities where potentially hazardous chemicals would be used shall be located in areas not susceptible to impact from slope failure.	
	1.3 Artificial slopes shall be constructed at the natural angle of repose (other than pit walls) and benched as necessary to prevent soil movement.	
2. Loss of potentially economic ore.	2.1 Protore shall be separated in overburden pile to the extent practical.	2. Not significant.
3. Potential instability of mine pit walls.	3.1 The orebody consists of consolidated rock. Therefore, slopes in the mine pit are expected to be very stable.	3. Not significant.
4. Paleontological resources could be lost if woodrat middens of paleontological value exist in area of project facilities.	4.1 A qualified paleontologist shall inventory the site for middens prior to surface-disturbing activities. If located, middens shall be assessed for potential scientific value and extracted at the discretion of BLM.	4. Not significant.
WATER RESOURCES		
1. Project water consumption would lower local ground water level and affect existing wells or flows at Piute Spring.	1.1 Projections for water requirements have been substantially reduced through plans for a system of drip irrigation. Studies indicate minimal or no effect would occur on the ground water basin or existing wells. No significant reduction in flow is expected at Piute Spring.	1. Not significant. Project water use would not affect other existing or potential uses.
	1.2 Ground water extraction shall be recorded at each well with flow meters. Well field drawdown would be monitored on an annual basis. If the amount of drawdown at monitoring wells exceeds the estimated 60 feet, the well field modeling shall be re-evaluated to assure that predictions of no noticable effect at Piute Spring remain valid.	
2. Soils and ground water could be exposed to toxic materials.	2.1 The heap leach system shall be designed as a closed circuit system that recycles solution to avoid potential contamination to soils or ground water.	2. Not significant.
	2.2 Leach pads, ditches, pipes, and solution ponds shall be designed and constructed in compliance with criteria of Regional Water Quality Control Board (RWQCB).	
	2.3 Ground water monitoring shall be conducted during operations to detect potential release of solution from containment system.	

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
WATER RESOURCES - Continued		
	2.4 Reagents and fuels shall be stored in areas protected by dikes or curbs designed to contain the contents of containers to avoid the potential for an accidental spill to affect water quality.	
	2.5 The Applicant shall develop and employ a plan for spill prevention control and recovery.	
3. Ground water withdrawal could lower water table such that local wells could go dry.	3.1 If local wells go dry as a result of the project, the Applicant shall be responsible for deepening the wells or otherwise provide replacement to the owner of the affected well.	3. Not significant.
4. Precipitation from storm events on heaps and ponds could increase quantity of solution.	4.1 Stormwater run-off from active leach piles shall be collected in solution pipes and conveyed to storage ponds. Ponds shall be designed for excess capacity to contain potential storm events as required by RWQCB.	4. Not significant.
5. Natural drainages would be altered.	5.1 Facilities shall be located to avoid major drainages. Drainage channels shall be constructed to divert minor drainages around facilities and return to their natural courses.	5. Not significant.
VEGETATION		
1. Onsite and offsite facilities and operations activities would disturb about 910 acres of vegetation in the Joshua tree woodland, blackbush scrub, and creosote bush communities. About 200 acres of desert grassland Unusual Plant Assemblage would be removed.	1.1 A site reclamation program shall be implemented in conjunction with project operations and in accordance with SMARA. Efforts to be completed shall be derived from a revegetation research program that shall emphasize development and employment of revegetation procedures based upon onsite studies and experimentation.	1. Not significant. While recovery may be on the order of 30 to 60 years, the vegetation affected is common to the region and comprises less than 0.4 percent of Lanfair Valley.
2. Surface disturbance could provide opportunities for establishment of exotic plant species.	2.1 Revegetation efforts shall be initiated as use of areas is completed. Weed control shall be implemented in conjunction with fertilization and seeding. If invasion of exotic species becomes a problem, a program for weed control shall be implemented in compliance with applicable State and Federal laws.	2. Not significant.
3. Project ground water withdrawal could affect stream flow and riparian vegetation at Piute Spring.	3.1 Detailed hydrologic studies and modeling were completed for this document to determine potential impact. Results demonstrated no significant reduction in flow would occur. No significant impact to vegetation is, therefore, expected.	3. No adverse effect.
4. Surface disturbances could impact plant species recognized by various agencies or groups as rare, threatened, endangered, or sensitive.	4.1 Onsite inventories and literature reviews were completed for this document to determine potential occurrence. No plants afforded legal protection or of special concern are known or expected to occur on the site.	4. No adverse effect.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
VEGETATION - Continued		
Ivanpah Access Route Alternative	*Ivanpah Access Route Alternative*	*Ivanpah Access Route Alternative*
1. Implementation would reduce overall project surface disturbance by about 20 acres, primarily in the Joshua tree woodland community.	1.1 No revegetation efforts would be necessary along the Searchlight Access Route.	1. Not significant
WILDLIFE		
1. Vegetation removal would degrade habitat for wildlife. Site and access roads are included in habitat range of some special interest species, including Bendire's thrasher, desert bighorn sheep, desert tortoise, and various raptors.	1.1 Habitat quality shall be reestablished through revegetation by the reclamation program and by natural processes.	1. Not significant. Affected habitat is common to region and comprises less than 0.4 percent of Lanfair Valley.
2. Construction of mine pits would remove about 60 percent of former mine workings and could affect bats or other species.	2.1 An onsite evaluation of mine workings as potential habitat was completed for this document. No significant use of shafts and adits by bats or other species is expected.	2. Not significant.
	2.2 An additional inventory of workings shall be completed during winter bat hibernating period to determine actual bat use. If a colony or substantial numbers of individuals is found, the workings would not be disturbed until the hibernation period had passed and the bats had gone.	
3. Project activities could affect wildlife onsite or in the project vicinity.	3.1 Applicant shall implement a wildlife education program for construction workers and employees to reduce indirect impacts to wildlife. Personnel shall be acquainted with laws protecting vegetation and wildlife, characteristics of desert wildlife, and proper procedures should wildlife be encountered. The importance of not harassing or otherwise interfering with wildlife, especially the desert tortoise, shall be stressed. Desert tortoise awareness signs shall be posted in areas where tortoises could occur.	3. Not significant.
4. At lower onsite elevations, impact to desert tortoise habitat and individuals could occur.	4.1 An onsite inventory for the desert tortoise was completed for this document. No tortoises were seen but burrows were found. If tortoises occur, their density is expected to be very low.	4. Not significant.
	4.2 Tortoise burrows shall be located and inspected prior to surface-disturbing activities. If tortoises are found, they shall be relocated offsite, using procedures acceptable to BLM.	
5. Two wildlife watering guzzlers are located in the vicinity of planned project activities. These activities could deter wildlife from using the facilities.	5.1 Guzzlers shall be removed and relocated at Applicant's expense, in accordance with BLM guidelines. This would reduce wildlife attraction to project area.	5. Not significant.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
WILDLIFE - Continued		
6. Project lighting could attract animals to areas where they could be affected by operations activities.	6.1 Where possible, shielded lighting shall be used to minimize attraction.	6. Not significant. Some attraction to site may be unavoidable, although operations activities would be expected to deter most animals.
7. Use of explosives and equipment would generate noise. Some animals, such as kangaroo rats and lizards, are rendered temporarily deaf when subjected to excessive noise and become vulnerable to predation. Communication noises (such as courtship and territorial vocalizations by birds) could be interrupted by project noises.	7.1 None available.	7. Not significant. Although unavoidable, the majority of noise would be limited to immediate source area. Effect is expected to be negligible within one mile of source. Impact would not significantly affect wildlife populations.
8. Cyanide solution may attract animals seeking water. Ingestion of cyanide solution or prolonged contact with skin can result in death. Contact by animals where sufficient quantities of solution are available to drink or bathe in could occur at solution ponds or the solution collection and conveyance system.	8.1 Several measures to isolate wildlife from processing solution shall be incorporated into project plans. Fencing around solution ponds shall exclude larger animals. Sheet metal shall be used at and below ground level to exclude small and burrowing animals.	8. Not significant. Measures incorporated in design would essentially eliminate wildlife exposure to processing solution. However, small animals may access points where limited quantities of solution is exposed.
	8.2 Ponds shall be covered with netting or other material acceptable to BLM to discourage access by bats and birds.	
	8.3 Heap piles shall be fenced with barbed wire. Drip irrigation would be used to distribute solution directly on top of heaps to minimize potential for surface ponding. Use of conventional sprinklers shall be limited to sides of heaps where no ponding is expected.	
	8.4 Solution shall be recycled. The system would operate as a closed circuit between ponds, processing plant, and heap piles, with solutions transported in closed pipes instead of open ditches.	
9. Project ground water withdrawal could affect stream flow and habitat at Piute Spring.	9.1 Detailed hydrologic studies and modeling were compiled for this document to determine potential impact. Results demonstrated no significant reduction in flow would occur. No significant habitat impact is therefore expected.	9. No adverse effect.
10. The regional raven population could increase if project garbage presents a new food source. Road kills from traffic could also provide additional food. If an increase in ravens occurred, they could prey on young tortoises.	10.1 Raven populations in the project vicinity shall be monitored by the project environmental specialist. Results would be provided to BLM to assess if an increase should occur.	10. Not significant. Project contribution to this secondary cumulative impact would be minimal and limited to operational period.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
WILDLIFE - Continued		
	10.2 Project waste shall be properly managed to control garbage that could attract ravens. Garbage would be kept in containers designed to exclude wildlife.	
	10.3 Project traffic shall be reduced by bus/van pooling, and access roads shall be posted for maximum speed limit of 35 mph, to reduce the probability of road kills.	
11. Traffic on access roads would increase impact to wildlife, particularly desert tortoise populations in Ivanpah and Piute Valleys. Piute Valley is of particular concern because the tortoise population has declined in recent years.	11.1 Applicant shall employ a program of bus/van pooling to reduce potential traffic. Drivers shall be educated about desert road driving, maintaining proper speeds, and the importance of not harassing or otherwise interfering with wildlife, especially the desert tortoise.	11. Not significant. Project traffic would be limited and would occur during operational period. Fencing would mitigate project impact and positively affect population status in the long term.
	11.2 Tortoise fencing and culverts shall be constructed along portions of the Searchlight Access Route and Ivanpah Access Route segments passing through crucial desert tortoise habitat. Fencing shall be checked regularly to maintain proper function.	
Ivanpah Access Route Alternative	*Ivanpah Access Route Alternative*	*Ivanpah Access Route Alternative*
1. Improvements to the Searchlight Access Route would not be completed. This would reduce overall habitat impact by about 30 acres. Potential for traffic impact to Piute Valley desert tortoise population would be decreased, while potential for traffic impact to Ivanpah Valley desert tortoise population would be increased.	1.1 No additional mitigation would be necessary.	1. Not significant.
AIR QUALITY		
1. Fugitive dust from activities could increase PM_{10} particulate levels. Total PM_{10} from project activities is estimated to be about 64 tons per year.	1.1 Haul roads within the site boundary shall be surfaced with durable gravel and shall be well maintained.	1. Not significant. Project contribution would not result in a violation of ambient air quality standards.
	1.2 Water or surface binding agents shall be applied to haul and access roads within the site boundary as needed, depending on traffic volumes, ambient wind, and climatological conditions.	
	1.3 Speed restrictions shall be enforced on mine roads to minimize surface disturbance of the roadways.	
	1.4 Unauthorized vehicle travel shall be restricted within the site boundary to minimize surface disturbance of the roadways.	
	1.5 Vehicle travel to and from the project site shall be reduced by the promotion of van pools/ busing for workers.	

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
AIR QUALITY - Continued		
	1.6 Air drilling equipment shall be shrouded with standard debris collecting devices and/or wet drilling techniques shall be utilized during all drilling operations. Manufacturer specifications for all shrouding devices shall be submitted to the SBCAPCD District for review prior to use. The debris collecting devices shall have a minimum design efficiency of 90 percent.	
	1.7 The live storage portion of the coarse ore stockpile shall be covered to minimize wind-blown dust.	
	1.8 Blasting during high winds shall be minimized or curtailed to minimize wind-blown dust.	
	1.9 The primary, secondary, and tertiary crushers, screens, and all transfer points shall be completely enclosed or shrouded to minimize exposure to wind and, at a minimum, shall use spray bars to control fugitive dust emissions. Conveyors shall be enclosed in selected areas where the moisture content and/or consistency of the material would allow generation of wind-blown dust. High pressure agglomerative dust suppression systems using chemical surfactants to reduce surface tension shall be used in areas of high particulate emission potential, such as the crusher discharges and the primary, secondary, and tertiary screens. Specifications for these systems shall be submitted to the District for review prior to intallation.	
	1.10 Revegetation efforts shall be initiated as use of certain areas is completed. This would reduce potential for fugitive dust.	
	1.11 PM_{10} concentrations shall be routinely monitored and submitted to SBCAPCD for the duration of project operations.	
2. Process and fuel emissions could reduce ambient air quality.	2.1 The majority of the onsite power would be generated using propane or natural gas. These sources are generally recognized to be clean burning fuels, with relatively low emission rates. The type of engine selected for the one diesel generator which is required would emit only about one half of the NO_x of comparable engines, because of its unique design to reduce combustion temperatures.	2. Not significant. Project contribution would not result in a violation of ambient air quality standards.
	2.2 Emissions from mobile equipment and vehicular engines shall be controlled by using only low sulfur fuels, implementing a routine maintenance program to avoid operating inefficiencies, and reducing vehicular traffic by providing project-sponsored bus/van pool for the majority of employees.	

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
AIR QUALITY - Continued		
3. Process solutions would release hydrogen cyanide gas.	3.1 Hydrogen cyanide shall be routinely monitored at the processing facilities as a requirement of the employee health and safety plan implemented according to Mine Safety and Health Administration regulations. These requirements mandate that HCN concentrations be below 10 parts per million. In addition, the Applicant shall periodically perform airborne HCN surveys to verify that the potential public exposure to cyanide is inconsequential.	3. Not significant. Hydrogen cyanide would be below MSHA threshold limits.
HEALTH AND SAFETY		
1. Explosives would be used to loosen ore.	1.1 Explosives shall be stored in a secured powder magazine constructed and maintained in accordance with Federal and local requirements. Only personnel holding valid blasting certificates shall be allowed to initiate blasting.	1. Not significant.
2. Employee and public safety concerns include industrial safety and industrial hygiene issues especially for use of potentially hazardous materials.	2.1 Applicant shall develop and employ a plan for spill prevention control and recovery.	2. Not significant.
	2.2 Areas where toxic solutions would be used shall have dikes or curbs to contain potential spills.	
	2.3 Project shall comply with applicable Mine Safety and Health Administration standards to achieve a safe working environment. Rules and regulations of County Department of Environmental Health Services (DEHS) shall be followed to assure that no significant public health hazard would be created.	
	2.4 First aid, fire suppression, and communications equipment shall be maintained onsite.	
3. Potential accidents associated with unauthorized entry into the mining area.	3.1 Fences shall be erected around potentially hazardous areas to preclude entry by unauthorized personnel or visitors. Personnel trained in security shall be onsite on a 24-hour basis.	3. Not significant.
4. Handling and disposal of process and other operations wastes.	4.1 Domestic and industrial wastes shall be managed and disposed of in a manner acceptable to BLM and the County.	4. Not significant.
	4.2 Domestic and nonhazardous wastes shall be properly stored and removed to Class III landfills.	

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
HEALTH AND SAFETY - Continued		
	4.3 Domestic sewage shall be disposed in leach fields acceptable to DEHS. Portable toilet waste shall be removed offsite by a contracted hauler.	
	4.4 Industrial wastes, fuels, and oils considered hazardous shall be recycled or removed to appropriate landfill or treatment facility.	
5. Transport of reagents and fuels to site could pose a hazard on roads.	5.1 Transport of hazardous materials shall be limited to daylight hours, Monday through Friday.	5. Not significant.
	5.2 Trucks containing hazardous chemicals shall be properly labeled and equipped to Interstate Commerce Commission specifications.	
	5.3 Drivers shall receive training in proper handling and spill cleanup measures for hazardous materials.	
6. Regular traffic on unmaintained or inadequate access roads could be hazardous.	6.1 Applicant shall provide road improvements and implement a regular maintenance program. A maximum speed limit of 35 mph shall be posted.	6. Not significant.
7. Potential accidents associated with entry into the reclaimed mine site.	7.1 A comprehensive Reclamation Plan that includes public safety measures shall be implemented.	7. Not significant.
VISUAL RESOURCES		
1. Operation activities, equipment, and structures would change visual character of site from passive to active.	1.1 Structures shall be painted with colors selected by BLM to blend into surrounding environment.	1. Not significant. Movement of trucks and equipment may attract eye of observers in Lanfair Valley. These effects would be limited to the operational period and would not alter long-term visual quality.
	1.2 Outdoor lighting for mine pits and other nighttime activities shall be shielded to reduce potential effects.	
	1.3 All operating facilities, including structures, equipment, transmission lines, and fencing, shall be removed at project completion, as required by BLM and by the Reclamation Plan.	
2. Project would modify topography and visual appearance of site. Upper walls of mine pits, overburden, heap piles, and existing clay pits would be visible from locations in Lanfair Valley.	2.1 Overburden and heap leach piles have been planned for locations that would minimize the degree to which they would be seen from primary roads. Low hills would partially conceal overburden. Heap piles would form low mesas near the valley floor. Overburden would be placed over Big Chief Hill clay pit.	2. Not significant. While land-form alterations and some color contrast would be unavoidable, project has been designed for "best practices" in conformance with the East Mojave National Scenic Area Plan. Impact would be compatible with existing character (VRM Class III) of southern Castle Mountains. Reclamation of Big Chief Hill clay pit may result in overall net positive impact.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
VISUAL RESOURCES - Continued	2.2 Site reclamation shall include modification of overburden and heap pile shapes to reduce potential impact of straight line geometrics. Revegetation would assist in reducing color contrasts. Upper mine pit walls shall be stained to reduce color contrasts. Big Chief Hill clay pit shall be reclaimed and upper walls stained.	
CULTURAL RESOURCES		
1. Project site is located in area known to contain evidence of historic and prehistoric activities. Surface disturbances could destroy these resources.	1.1 Inventories of prehistoric and historic resources have been completed for the project site and surrounding areas. Results have been reviewed by BLM, and a proposed data recovery program has been prepared and submitted to the State Historic Preservation Officer (SHPO) for review. 1.2 Pursuant to State and Federal law, recovered resources shall be curated at specific institutions. 1.3 Determination of National Register of Historic Places eligibility and effect to cultural sites is being coordinated with California and Nevada SHPOs. Any additional mitigation required shall be incorporated. 1.4 In addition to the data recovery program, the Applicant has incorporated measures to reduce potential impact to cultural resources in the general vicinity. A chain link fence shall be constructed around the Hart townsite cemetery and a descriptive sign posted. Employees shall be informed about cultural resources and the need for their preservation. Access roads to areas of high cultural resource sensitivity shall be closed or rerouted, as directed by BLM.	1. Not significant.
Ivanpah Access Route Alternative	*Ivanpah Access Route Alternative*	*Ivanpah Access Route Alternative*
1. No improvements along the Searchlight Access Route would be completed. No potential for impact to cultural resources along that route would occur.	1.1 No additional mitigation measures would be necessary along the Searchlight Access Route.	1. Not significant.
LAND USE		
1. Project activities could be incompatible with other uses of site and surrounding area including clay pit mining activities, livestock grazing, and recreation uses.	1.1 Applicant shall ensure that project activities would not preclude access to clay pits by owners or operators. 1.2 Applicant shall construct and maintain fencing to restrict livestock from operational areas. Cattle guards shall be installed at points where fences cross access roads. 1.3 Applicant shall provide alternate water sources if project activities would interfere with existing livestock watering facilities.	1. Not significant. A reduction in about 37 AUMS of livestock forage capacity would occur until vegetation recovery is complete. This unavoidable impact would not significantly reduce livestock production.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
LAND USE - Continued		
	1.4 Grazing lessees shall be compensated by Applicant for livestock killed or injured by vehicles driven by project employees.	
	1.5 An interpretive site and viewing area shall be provided for recreational visitors to project. The site shall include descriptive information about current mining operations and the history of the Hart Mining District.	
	1.6 A historical marker shall be constructed along the Searchlight Access Route, describing the history of the former Barnwell and Searchlight Railroad.	
	1.7 Reclamation plans and procedures shall include provisions to continue existing uses following project completion. Mine pits shall be accessible to operators for additional recovery of low grade ore. Revegetation of grassland would provide for livestock grazing. Casual recreation activities would again be permitted in the project area.	
2. Provision of improved access from Piute Valley could increase recreational uses in Lanfair Valley with indirect impacts to wildlife and grazing uses.	2.1 Access Route use shall be limited to operational period. Public use would discontinue following road reclamation.	2. Not significant. Surface disturbances by casual recreation use would be limited in extent.
Ivanpah Access Route Alternative	*Ivanpah Access Route Alternative*	*Ivanpah Access Route Alternative*
1. No improvements to the Searchlight Access Route would be completed. No potential for conflicts with grazing uses along that route would occur.	1.1 Revegetation and reclamation along the access route would not be necessary. Additional fencing and cattle guards would not be necessary. The historical marker for the Barnwell and Searchlight Railroad would not be constructed. No mitigation would be required.	1. Not significant.
SOCIOECONOMICS		
1. Project operating employment of about 150 persons would increase population and place demands on housing availability.	1.1 Reviews of regional housing completed for this document determined that adequate housing would be available to meet limited project employee demand. No mitigation would be required.	1. No adverse effect.
2. Project activities could generate demand for public emergency response services.	2.1 First aid training shall be provided and appropriate equipment maintained onsite. Procedures for emergency response shall be developed for use in the event of an accident. Personnel trained in security would be on duty 24-hours per day.	2. Not significant.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

TABLE 1.1.1

SUMMARY OF POTENTIAL EFFECTS AND MITIGATION MEASURES
(Continued)

POTENTIAL EFFECTS	MITIGATION MEASURES	SIGNIFICANCE AFTER MITIGATION
INFRASTRUCTURE		
1. Project would create need for adequate access roads and utilities, including power and water.	1.1 Applicant shall provide upgrading and maintenance of dirt access roads. Utilities for the project shall be self supporting and provided by Applicant.	1. No adverse effect.

Note: Potential effects and mitigation measures apply to both Proposed Action and Ivanpah Access Alternative unless otherwise indicated.

CHAPTER 2.0
INTRODUCTION

2.0 INTRODUCTION

1. The purpose of this Environmental Impact Statement/Environmental Impact Report (EIS/EIR) is to: (1) identify and evaluate potential impacts of the proposed action on the environment, (2) indicate the manner in which those effects can be mitigated or avoided, and (3) identify alternatives to the project. The proposed action would be located at a site in the southern Castle Mountains of San Bernardino County, California, shown in Figure 2.1.1, Aerial Photograph of Castle Mountains. The project would involve the construction, modification, and operation of a proposed open pit heap leach gold mining operation known as the Castle Mountain Project.

2.1 PROJECT BACKGROUND

1. An exploration program was initiated by the Applicant in 1983 in the Hart Mining District of the Castle Mountains. Initial results were encouraging, and a program of property acquisition, exploratory drilling, metallurgical testing, and environmental studies was completed, resulting in the discovery of disseminated gold orebodies of commercial value.

2. In compliance with Federal regulations, a proposed Plan of Operations was submitted to the U.S. Bureau of Land Management (BLM) for full development of operations in June 1987 (B&B, 1987). The plan proposed an open pit heap leach gold mine that would process ore for about 10 years at a rate of approximately three million tons per year (MTY), employ 125 to 150 people, and use about 1,650 acre-feet of water annually. The plan was circulated for public review and comment in August 1987, and the project received conditional approval in November 1987. Two appeals to the decision were filed.

3. Subsequent to approval of the June 1987 Plan of Operations, elements of the project were revised, based on environmental and engineering considerations. Plans for heap leach piles were reconfigured. The proposed site for the overburden pile was shifted approximately one mile west, closer to the other facilities. Water requirements were reduced through proposed operational modifications to about 725 acre-feet per year. A new Plan of Operations was submitted to BLM in March 1988, and a proposed site plan and reclamation plan were submitted to the County of San Bernardino (Viceroy, 1988b). In view of the modifications made subsequent to the approval of the initial (1987) Plan of Operations and the belief that environmental issues could best be addressed in an environmental document that could be used by both BLM and the County, it was determined that an EIS/EIR should be prepared.

This photograph of the southern Castle Mountains was taken from a point above the western portion of the proposed Castle Mountain Project site. Hart Mine Road leads to former Hart townsite and active clay pit at left center. Road in foreground leads to Big Chief Hill clay pit at right. Other roads on hills at center lead to former mine workings and exploratory drilling sites. View northeast.

FIGURE 2.1.1

AERIAL PHOTOGRAPH OF CASTLE MOUNTAINS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

2.2 INTENDED USES OF THE EIS/EIR

2.2.1 BUREAU OF LAND MANAGEMENT

1. Mining activities on Federal lands are authorized by the General Mining Law of 1872. Federal regulations require that mining operations, including access, proposed on Federal land be reviewed by BLM. The BLM is required to approve any operations as long as such activities will not cause unnecessary or undue degradation to the public lands. Certain mining related activities such as water pipeline and powerline routes outside the area of operation require rights-of-way authorizations, and must be in the public interests before such activities can be approved.

2. The BLM will use this EIS/EIR, along with other information, in its consideration of the proposed Plan of Operations for the Castle Mountain Project. For this purpose, BLM is the Lead agency for National Environmental Policy Act (NEPA) compliance.

2.2.2 COUNTY OF SAN BERNARDINO

1. While the County does not regulate the use of Federal land, it is responsible for implementing the California Surface Mining and Reclamation Act (SMARA) and for approval of the proposed site plan in accordance with the County Development Code.

2. This document will be used by the San Bernardino County Planning Commission along with other information, in their consideration of the Site Approval Application and Reclamation Plan for the Castle Mountain Project. For this purpose, the County is the Lead agency for California Environmental Quality Act (CEQA) compliance.

2.2.3 OTHER AGENCIES

1. Numerous permits and approvals by other local, State, and Federal agencies would be needed for aspects of the proposed project, including air quality permits for authority to construct and permit to operate (SBC-Air Pollution Control District), building permit (County Department of Building and Safety), sewage disposal (County Department of Environmental Health Services), right-of-way or special use permit (BLM), emergency fire, evacuation, and rescue plans (Department of Labor, Mine Safety and Health Administration), water well drilling, and road and water pipeline rights-of-way (State Lands Commission), and others. A list of the

major permits and approvals that would be required for the Castle Mountain Project is provided in Appendix B. Other agencies listed in the appendix would use this document in their consideration of these permits.

2.3 ENVIRONMENTAL PROCESS

2.3.1 ENVIRONMENTAL REGULATIONS

1. Elements of the proposed action are subject to review and approval of Federal (BLM) and County (County of San Bernardino) agencies. Environmental review requirements of these agencies differ slightly according to Federal and State guidelines. To accommodate these differences, this document has been prepared as a joint Environmental Impact Statement (EIS) and Environmental Impact Report (EIR) in accordance with provisions of the National Environmental Policy Act (NEPA) (40 CFR Part 1506.2) and California Environmental Quality Act (Section 15526 of the Guidelines for Implementation of CEQA).

2. The NEPA of 1969 was enacted as law on January 1, 1970, as a national policy to maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans. It established the Council on Environmental Quality (CEQ) for coordinating environmental matters at the Federal level and to serve as advisor to the President on such matters. Under the Act, Federal actions and approvals which could have significant impact on the environment are subject to review by Federal, State, and local environmental authorities. The CEQ regulations (40 CFR 1500-1508) implement NEPA.

3. The California Environmental Quality Act (CEQA) of 1970 (as amended) was developed subsequent to NEPA and applies to agencies of State or local governments that regulate activities of private individuals, corporations, and public agencies which are found to affect the quality of the environment. Activities are regulated so that major consideration is given to preventing environmental damage, while providing a decent home and satisfying the living environment for every Californian. The State CEQA Guidelines (Section 15000-15387) implement CEQA.

2.3.2 IMPLEMENTATION

1. The following briefly summarizes the EIS/EIR process as it relates to the proposed Castle Mountain Project:

   - Notice of Intent and Notice of Preparation - Public notification to prepare an EIS/EIR. The Notice of Intent for the proposed Castle Mountain Project was published in the Federal Register on May 4, 1988. The Notice of Preparation was distributed to State agencies and local organizations on June 22, 1988. Copies of these documents are included in Appendix A.
   - Public Scoping Meetings - Public scoping meetings were held on May 23 and 26, 1988, to solicit input from interested individuals, groups, agencies, and elected officials. These meetings were announced by: (1) notice to over 700 local and regional media sources (newspapers, radio, television), and (2) direct mailing of over 5,000 notices to individuals and organizations on the BLM Desert Plan mailing list and a list provided by Stateline Resource Area, Nevada. In addition, a special meeting was held at the BLM office in Sacramento where BLM, the County, and the Applicant met with representatives of The Wilderness Society and Sierra Club Legal Defense Fund to discuss the project and environmental concerns. Items or issues to be addressed as part of the EIS/EIR were compiled from both oral and written statements. Copies of public scoping notifications and comments received are included in Appendix E.
   - Preparation of the Draft EIS/EIR - The Draft EIS/EIR was prepared to identify, describe, and analyze the environmental issues of the proposed action and alternatives.
   - Notice of Completion and Federal Register Publication - The availability of the completed Draft EIS/EIR was noticed by the County of San Bernardino with a Notice of Completion and by BLM through the U.S. Environmental Protection Agency in the Federal Register.
   - Public Release of the Draft EIS/EIR for Review and Comment - This Draft EIS/EIR has been released for review for 60 days to the public, including interested individuals, groups, government representatives, and agencies.
   - Public Hearing - Three public hearings are scheduled to be held during the 60-day Draft EIS/EIR review period to provide the public with an opportunity to verbally comment on the document.
   - Preparation of the Final EIS/EIR - A Final EIS/EIR will be prepared. It will incorporate and respond to all public comments received as a result of public review of the Draft EIS/EIR.

- Record of Decision - After publication and circulation of the Final EIS/EIR and a 30-day waiting period, BLM will make its decision regarding the proposed action, prepare a public record statement on its decision, and publish the decision in the Federal Register. The County of San Bernardino will hold a public hearing to certify the adequacy of the Final EIS/EIR, make its decision regarding the proposed action, prepare and publish a record of decision, and file a Notice of Determination.

2.4 REGULATORY COMPLIANCE

1. This section summarizes the legislative and regulatory framework which, in addition to the National Environmental Policy Act, Council on Environmental Quality, and California Environmental Quality Act guidelines, would be addressed as part of the proposed action. Various aspects of the proposed action, as shown below, must be in compliance with appropriate Federal and State environmental requirements before full implementation is permitted. These additional regulations apply to those aspects of the project which could involve endangered species, cultural resources, and air and water quality. For the proposed action, numerous different acts, codes, resolutions, and sets of agency rules and regulations have been identified. This regulatory framework is summarized for each environmental issue in Chapter 6.0, Mitigation Measures, and permits and other approvals are listed in Appendix B.

2.4.1 ENDANGERED SPECIES

2.4.1.1 Federal Endangered Species Act

1. The Federal Endangered Species Act (ESA) of 1973, as amended (the Act), extends legal protection to plants and animals listed as endangered or threatened by the U. S. Fish and Wildlife Service (FWS). The Act authorizes the FWS to review proposed Federal actions to assess potential impacts to listed species.

2. Listed species are those which are *threatened* or *endangered* (in danger of extinction throughout all or a significant portion of their range) and which have been the subject of final regulation and listing in the Federal Register, and those species officially proposed for listing in a Federal Register notice.

3. Candidate species are those which are not yet the subject of a proposed or final ruling to become listed. Two categories of Candidate species and one category of non-candidate species are recognized:

   - Category 1 - Candidate species for which there is adequate information to support the appropriateness of proposing to list as threatened or endangered.

- Category 2 - Candidate species for which there is information that indicates that proposing to list as threatened or endangered is possibly appropriate, but substantial data on vulnerability and threat are not currently known.
- Category 3 - Species that are no longer under consideration for listing.

4. Section 7, the interagency portion of the ESA, requires Federal agencies, in consultation with the FWS, to ensure "that any action authorized, funded or carried out by such agency... is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of [critical] habitat."

2.4.1.2 California Endangered Species Act and Native Plant Protection Act

1. The California Endangered Species Act (CESA) of 1984 and the Native Plant Protection Act (NPPA) of 1977 are administered by the California Department of Fish and Game (DFG). In addition to rare and endangered species, the State of California includes candidate species for plants and wildlife. Candidate species are those that have been accepted by the State for review and potential inclusion to the list of rare, threatened, or endangered species. The rare designation applies to plants only and includes those plants that are not threatened or endangered but could be eligible due to decreasing numbers or further restrictions to habitat. Maintaining priority within the various lists is the function of California Natural Diversity Data Base (CNDDB), which is also maintained by DFG.

2.4.1.3 BLM, Federal, and State Sensitive Species List

1. "Sensitive" plants are designated by BLM's California State Director and must meet at least one of the following criteria: (1) plants identified as candidates for listing as endangered or threatened by the FWS in a Federal Register Notice of Review, (2) plants that have been officially proposed for listing as endangered or threatened by the FWS in a Federal Register Notice, or (3) plants that do not meet either of the above criteria, but have been designated as sensitive by the State Director, based in part on information from the CNDDB and private groups such as the California Native Plant Society. The purpose of the designation is to provide increased management attention to prevent population and habitat declines that might result in Federal or State listing as endangered or threatened. No particular habitat or population management action is required or prohibited by the "sensitive" species designation.

2.4.2 CULTURAL RESOURCES

2.4.2.1 National Historic Preservation Act (Section 106)

1. The National Historic Preservation Act of 1966 (NHPA), as amended, established: (1) a National Register of Historic Places (NRHP) to be maintained by the Secretary of the Interior, (2) the position of State Historic Preservation Officer (SHPO), and (3) the Advisory Council on Historic Preservation (ACHP). Section 106 of the Act requires Federal agencies to provide the SHPO and ACHP an opportunity to comment on any project on Federal lands within their state that would affect properties included in or eligible for inclusion in the NRHP. Section 304 directs Federal agencies to withhold from disclosure to the public information relating to the location or character of eligible properties whenever disclosure of such information may create risk of harm to such resources.

2. NRHP eligibility criteria specify that the quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of national, State, or local importance that possess integrity of location, design, setting, materials, workmanship, feeling, association, and the following:

   - are associated with events that have made a significant contribution to the broad patterns of history; or
   - are associated with the lives of people significant in our past; or
   - embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
   - have yielded or are likely to yield information important in prehistory or history.

3. The Advisory Council regulations, "Protection of Historic and Cultural Properties" (36 CFR 800: Federal Register, Vol. 51, No. 169, September 2, 1986), outline procedures to be followed by Federal agencies. Federal agencies are required to consult with the SHPO to determine if a proposed undertaking encompasses any property included in, or eligible for inclusion in, the NRHP. For each eligible property identified, the Federal agency must determine if the proposed undertaking would have an effect. If there could be an effect, the Criteria of Adverse Effect are applied, and treatment measures are developed for resources that

would be adversely affected. The regulations provide for consultation with the SHPO and ACHP to develop conditions for a Memorandum of Agreement for mitigation of potential adverse effects.

4. Within statutory constraints (NHPA Section 304 and Archaeological Resources Protection Act of 1979, Section 9), the Advisory Council regulations encourage participation by local governments, Native American tribes, and the public (36 CFR 800.1 [c] [2]). Within this context, comments on the Castle Mountain Project are sought from the County of San Bernardino, the Native American Heritage Commission, the local Native Americans, archaeologists, historians, and other groups or individuals concerned with cultural resources.

2.4.2.2 American Indian Religious Freedom Act

1. The American Indian Religious Freedom Act of 1978 (P.L. 95-341; 92 Stat. 470) resolves that it shall be the policy of the U.S. to protect and preserve for the American Indians their inherent right of freedom to believe, express, and exercise their traditional religions.

2.4.3 AIR QUALITY

1. Construction and operation of the Castle Mountain Project would be subject to Federal, State, and local rules and regulations, as implemented through provisions of the Clean Air Act of 1971, pertaining to the control of air pollutants emitted to the atmosphere. Region IX of the Environmental Protection Agency (EPA) in San Francisco, California, has Federal jurisdiction over the area, and the California Air Resources Board (CARB) is responsible at the State level. At the local level, the San Bernardino County Air Pollution Control District (SBCAPCD) has authority over sources of air pollutants emitted in the area.

2. The CARB serves as a technical review and advisory agency, providing technical advice to SBCAPCD when necessary, and offering guidance when SBCAPCD regulations are not sufficiently detailed to address a particular problem. Under the provisions of the Clean Air Act, SBCAPCD has fulfilled Federal requirements that allow a local agency to administer Federal Clean Air Act policies. Thus, SBCAPCD will have primary regulatory review authority over potential sources of air pollution associated with the proposed action.

2.4.3.1 Clean Air Act

1. The Clean Air Act was established in an effort to ensure that minimum levels of air quality are maintained in all areas of the U.S. These minimum levels were based upon health-related exposure levels and were termed "National Ambient Air Quality Standards" (NAAQS). The NAAQS are legal limits on the allowable ambient levels of air pollution, and they specify the maximum allowable concentration of a pollutant or class of pollutants in the atmosphere and thus characterize the amount of exposure deemed safe to the public. Pollutants for which NAAQS have been established are nitrogen dioxide, sulfur dioxide, carbon monoxide, suspended particulate matter less than 10 microns in aerodynamic diameter, reactive organic compounds, and ozone. These are often termed "criteria pollutants."

2. There are primary and secondary NAAQS. The primary standards are intended to reflect levels of air quality and include an adequate margin of safety deemed necessary to protect the public health. The secondary standards reflect the levels of air quality necessary to protect public welfare from any other known or anticipated adverse effects of a pollutant. Most areas of the country were required to attain the primary standards no later than December 31, 1982, with conditional extensions to 1987 granted to certain "problem" areas. Areas found to be in violation of the primary standards were termed "nonattainment areas."

3. Under the Clean Air Act, State and local authorities were given primary responsibility for assuring that their respective regions were in attainment of, or had a verifiable plan to attain, the NAAQS. This provision also gave State and local agencies authority to promulgate more stringent ambient air quality standards should they desire. In California, CARB has promulgated its own set of California Ambient Air Quality Standards (CAAQS). There is no deadline for attainment of the CAAQS. The SBCAPCD has not adopted any ambient air quality standard more stringent than the CAAQS.

4. Areas that do not attain the NAAQS are required by the Clean Air Act to prepare Air Quality Attainment Plans in order to formulate a program of controls upon existing and proposed sources of air pollutant emissions, such that attainment of the NAAQS may be guaranteed by a certain target date.

2.4.3.2 SBCAPCD Rules and Regulations

1. The SBCAPCD is empowered to regulate sources of air pollutant emissions in such a manner that the region within its jurisdiction either attains or is projected to attain the NAAQS for all criteria pollutants. Should it become clear that any part of the region is moving away from attainment of the standards, SBCAPCD will implement corrective measures to bring the region back into attainment. These could include measures such as lowering net emissions, increasing trigger levels, and creating more stringent air pollution control regulations to cover any new emission source. In certain instances, these regulations could be retroactive and require existing emission sources to conform with the new regulations.

2. As a method to inventory all sources of air pollutant emissions, SBCAPCD Rule 201 requires that:

   - A person shall not build, erect, install, alter, or replace any equipment, the use of which may cause the issuance of air contaminants or the use of which may eliminate, reduce, or control the issuance of air contaminants without first obtaining written authorization for such construction from the Air Pollution Control Officer.

   This means that any device that emits or controls the emission of air contaminants to the atmosphere must obtain an "Authority to Construct" (ATC) permit from the SBCAPCD before it can be built. Once a unit has been constructed and verified to be in compliance with SBCAPCD regulations, a Permit to Operate is issued.

3. Emissions increases from permitted sources of any contaminant for which there is a NAAQS are addressed by SBCAPCD rules and regulations. Under SBCAPCD guidelines, Best Available Control Technology (BACT) and an Air Quality Impact Analysis (AQIA) are required for any net emissions increase in excess of 250 pounds per day of any air contaminant from a stationary source. If the Applicant cannot show that the emission source was constructed using BACT, a permit to construct may be denied. Also, should the AQIA demonstrate that emissions of any "affected air contaminant" [an air contaminant, including precursors for such a contaminant, for which the NAAQS was exceeded more than three discontinuous times within the SBCAPCD within the three years immediately preceding the filing of the application for ATC (more than once in the case of an annual standard)], would violate any national ambient air quality standard, a permit to construct may not be granted. Additionally, a net emissions increase of an affected air contaminant in excess of 250 pounds per day must be offset, unless, in the case of NO_x, it can be shown by modeling that the

emissions of NO_x will not violate any State and Federal ambient air quality standard. In the case of other such affected air contaminants, air quality monitoring data for the area affected by the new source must show that the standards for such air contaminants have not been exceeded during the year immediately preceding the date of application for ATC.

4. An AQIA consists of using an air quality model to estimate the downwind impact that may result from operation of a proposed project. Results of air quality modeling are added to existing background air quality concentrations to determine whether the project emissions will contribute to violations of ambient air quality standards. Required input to air quality models includes: (1) meteorological data that are descriptive of the proposed project's location, and (2) background air quality concentrations derived from actual monitoring data in an area determined to be representative.

2.4.4 WATER QUALITY

2.4.4.1 California Regional Water Quality Control Board

1. The California Regional Water Quality Control Board (RWQCB), Colorado River Basin, regulates project systems with the potential to discharge liquids to surface or subsurface waters of the State. The review and permitting process follows requirements of the California Code of Regulations, Title 23, Subchapter 15, Article 7 (Mining Waste Management), and the California Porter-Cologne Water Quality Act of 1985.

2.4.4.2 Clean Water Act

1. The Clean Water Act is administered by the EPA, which delegates authority to the State Water Resources Control Board and, ultimately, to the RWQCB. The act defines the primary and secondary standards for the maximum contamination levels of such contaminants as heavy metals and solvents in drinking water. Treated water discharged to surface water would be subject to the requirements of a National Pollution Discharge Elimination System permit, which in effect ensures that the water discharged meets drinking water quality standards at the point of discharge.

2.4.4.3 Resource Conservation and Recovery Act

1. The Resource Conservation and Recovery Act of 1976 (RCRA), Part 266, incorporates special standards for handling hazardous materials. The California Code of Regulations, Title 22, Environmental Health, Chapter 30, also sets minimum standards for the management of hazardous wastes, in accordance with RCRA requirements. Title 22 is administered by the State of California, Department of Health Services.

2.4.5 LAND USE

1. The proposed Castle Mountain Project must comply with a number of Federal, State of California, State of Nevada, and San Bernardino County policies and regulations addressing surface mining operations. The BLM and the County of San Bernardino are responsible for reviewing and approving overall mining operations at the Castle Mountain Project site. Other Federal, State, regional, and local agencies have permit authority over specific components of the proposed mining operations.

2.4.5.1 Bureau of Land Management

1. Federal Land Policy Management Act - The Federal Land Policy Management Act (FLPMA) was passed as law in 1976 to direct the management of public lands of the U.S., and it defines specific procedural measures and environmental standards that mining operations must comply with to prevent "unnecessary or undue degradation" of Federal lands. In areas where specific statutory authority requires that a stated level of environmental protection or reclamation be attained, such as within the California Desert Conservation Area (CDCA), that level of protection must be met. FLPMA includes provisions for application of regulations to "protect the scenic, scientific, and environmental values of the public lands of the California Desert Conservation Area against undue impairment..." (Title VI, Section 601 (f).

2. General Mining Law of 1872 - Under the General Mining Law of 1872, a person has a statutory right, consistent with BLM regulations, to engage in mining activities. As a locatable mineral, the mining of gold on open Federal land is authorized by the Law and, therefore, is an activity over which BLM does not have discretionary authority.

3. California Desert Conservation Area Plan and East Mojave National Scenic Area Plan - Section 601 of FLPMA required that BLM develop a plan to "provide for the immediate and

future protection and administration of the public lands in the California Desert within the framework of a program of multiple use and sustained yield, and the maintenance of environmental quality." In accordance with FLPMA, the CDCA Plan was developed for management of the public lands of the California Desert by BLM. The East Mojave region of the California Desert was designated a National Scenic Area in 1980 as an integral part of the CDCA. An East Mojave National Scenic Area (EMNSA) Management Plan was subsequently developed as an extension of the CDCA Plan guidelines and policies to more specifically address the issues facing this region.

4. Wilderness Study Areas - Approximately 50 percent of the EMNSA has been designated as wilderness study areas (WSAs) pursuant to Section 603 of FLPMA. The purpose of the wilderness program is to identify areas that have remained in an essentially natural state for inclusion in the National Wilderness Preservation System, which would preserve these areas for the enjoyment of future generations. The EMNSA Plan addresses measures to protect 23 WSAs (seven WSAs recommended by BLM as suitable and 16 recommended by BLM as unsuitable for wilderness designation) until Congress takes final action on BLM's recommendations. Prior to a decision by Congress, surface disturbing activities within WSAs are reviewed for compliance with the nonimpairment criteria established by the Interim Management Policy and Guidelines (IMP) for Wilderness Review (BLM, 1987). The BLM's actions include posting signs and increasing surveillance and monitoring of these areas.

2.4.5.2 County of San Bernardino

1. San Bernardino County has regulatory authority over unincorporated land not directly regulated by State and Federal government agencies or Indian tribes. Although the County does not regulate the use of Federal land, it is the designated Lead agency responsible for implementing SMARA, which applies to mining operations on Federal land within the State of California. The County also provides information and guidance on future uses and activities that can be used by other agencies to coordinate land use decisions, through the framework of the County General Plan and the Development Code.

2.5 PUBLIC SCOPING PROCESS

2.5.1 PUBLIC NOTIFICATIONS AND COMMENTS RECEIVED

1. A public scoping process was initiated, as required by National Environmental Policy Act (NEPA) and California Environmental Quality Act regulations and encouraged by the Council on Environmental Quality. Public scoping was undertaken to identify the range of actions, alternatives, mitigation measures, and significant effects to be analyzed in depth in the EIS/EIR, and to eliminate from detailed study issues found not to be important. It was designed to solicit comments from the general public and from local, State, and Federal government agencies. Notifications included: (1) publication of the Notice of Intent in the Federal Register by BLM, (2) direct mailing of a Notice of Preparation to potentially interested agencies and individuals by the County, (3) public notice to over 700 regional and local media sources (newspapers, radio, television), indicating the nature of the project, and the date, time, and location of public scoping meetings, (4) direct mailing of a letter by BLM to over 5,000 individuals and organizations, indicating the nature of the project and the date, time, and location of public scoping meetings, (5) two public scoping meetings, which were held at accessible regional locations, and (6) a special meeting at the Sacramento office of BLM to discuss environmental concerns with representatives of The Wilderness Society and Sierra Club Legal Defense Fund. Copies of the public notices, mailing list, and scoping documents are provided in Appendix E.

2. The scoping process culminated with two public meetings, held on May 23, 1988, at Clark County Education Center, 2832 East Flamingo Road, Las Vegas, Nevada, and May 26, 1988, at Barstow Super Station 8, 1511 West Main Street, Barstow, California. The meetings were conducted to provide an opportunity for the public and governmental agencies to submit verbal comments on the issues to be addressed in response to a presentation on the proposed action. Those not able to attend a public meeting were invited through the published notifications to submit written comments.

3. As a result of the scoping process, the primary issues of public concern were identified. They are summarized in Table 2.5.1, Castle Mountain Project Public Scoping Process Summary of Issues, according to the type and number of comments received.

TABLE 2.5.1

CASTLE MOUNTAIN PROJECT
PUBLIC SCOPING PROCESS
SUMMARY OF ISSUES

ISSUES	NUMBER OF COMMENTS
Socioeconomics • Economic benefits to local communities • Employment opportunities	40
Hydrology • Capacity of Lanfair Valley aquifer to support ground water withdrawals • Relationship of ground water aquifer to surrounding water sources, especially Piute Spring • Availability of alternative water sources • Potential contamination of water resources from operations	38
Wildlife • Impact of project on wildlife habitat • Impact of heap leach process and solution ponds on wildlife • Effectiveness of reclamation activities on wildlife habitat • Impact on bighorn sheep and desert tortoise	36
Land Use • Short- and long-term relationships between project and current/future land uses • Impact of improved public accessibility to "backcountry areas" • Relationship of project to East Mojave National Scenic Area (EMNSA) and wilderness study areas	35
Vegetation/Reclamation • Vegetation removal due to project operations • Effectiveness of reclamation activities • Impact of access road on vegetation • Impact on sensitive species • Potential establishment of exotic species	33
Access/Recreation • Impact of action on recreational activities • Recreational value of reclaimed site	29

TABLE 2.5.1

CASTLE MOUNTAIN PROJECT
PUBLIC SCOPING PROCESS
SUMMARY OF ISSUES
(Continued)

ISSUES	NUMBER OF COMMENTS
Hazardous Materials	26
• Impact of transporting, storing, and using hazardous materials	
Visual/Scenic	14
• Conformance with Visual Resource Management objectives	
• Impact of power lines and transmission facilities	
Air Quality	14
• Impact of dust from project traffic	
• Impact of pollutant emissions from equipment operation, processing, and onsite power generation	
Cultural/Historical	10
• Potential impact to cultural and historic resources	
• Measures taken to protect cultural and historic resources	
Wilderness	6
• Compatibility of mining operations with adjoining wilderness study areas	
• Potential for impairment of wilderness values by project	
Geology/Paleontology	6
• Use of mineral resources	
• Woodrat middens	
• Clay Pits	

2.5.2 PROJECT MODIFICATIONS

1. Based upon the comments received during the scoping process and the environmental impact analyses completed for this report, the Applicant has elected to incorporate several suggestions to modify elements of the proposed project design and operations to reduce or avoid potential environmental impacts. These changes to the initial project description and preliminary design are summarized below.

   - Water Resources
     - Annual water requirements were reduced over 35 percent (from 1,140 to 725 acre-feet) through planned operational procedures. Ore would be crushed to optimize leaching time and minimize water use.
     - Drip irrigation would be used to apply the leaching solution to reduce evaporation.
     - To ensure that planned water use is not exceeded and that the estimated area of drawdown would not affect ground water in the vicinity of Piute Spring, total flow meters would be used to monitor withdrawal at each well. If drawdown at monitoring wells exceeds the 60 feet estimated by hydrologic modeling, project water use would be reevaluated using aquifer properties determined from the monitoring data to assure that predictions of no noticeable effect at Piute Spring remain valid.
     - If existing wells near the West Well Field go dry as a result of the project, the Applicant would incur costs to have the well deepened, or provide replacement water.
   - Vegetation
     - In order to maximize the success and reduce the time of revegetation, the Applicant would develop a revegetation research program based upon information provided by experts qualified in desert flora. The program would establish goals for vegetation recovery and time frames for achievement, and would include such procedures as stockpiling of available soil, salvaging of plants amenable to transplantation, establishment of a nursery, monitoring for exotic species, ripping and harrowing of compacted soils, reseeding, transplanting, fertilizing, and watering.
     - A long-term monitoring program would be implemented following project completion to verify revegetation results based upon the goals for species composition and cover, and to determine what additional measures would be necessary.
     - Because reestablishment of desert vegetation to pre-disturbance cover and composition is expected to be a lengthy process, revegetation efforts would be initiated during the operational period as use of an area is completed.

- Wildlife
  - A program to acquaint employees with desert wildlife protection would be implemented in conjunction with the project safety program. Drivers would be instructed regarding proper road speeds and the importance of not harassing or otherwise interfering with wildlife, especially the desert tortoise. Special instruction on tortoises would be provided to employees and construction workers.
  - An environmental specialist or contracted consultant would be employed by the Applicant to monitor and report to BLM on the effectiveness of wildlife mitigation measures and the revegetation program.
  - Methods would be employed to protect wildlife from process solution, including:
    - Storage ponds would be surrounded by chain link and tortoise fencing and covered with netting designed to exclude terrestrial and avian wildlife.
    - Drip irrigation of solution would be employed (instead of conventional sprinklers) over the top of heap piles to minimize the potential for solution ponding.
    - The solution collection and distribution system would be operated as a closed circuit, with solution transported in a system of pipes instead of open ditches.
  - Measures would be employed to protect the desert tortoise, including:
    - The site would be inventoried for active burrows. Burrows would be avoided whenever possible. Relocation of tortoises, if necessary, would be coordinated with BLM.
    - Employees would be bussed to the site to reduce project traffic and its potential impact on the tortoise in Ivanpah and Piute Valleys.
    - The Applicant would construct fencing and culverts to protect tortoises in crucial habitat along portions of Clark County Road A68P and Ivanpah Road. Inventories of desert tortoise densities along these roads would be completed to aid BLM in determining the effectiveness of tortoise fencing and the need for culverts under the road.
    - Raven populations would be monitored by the environmental specialist to assist BLM in its program to reduce raven predation on tortoises.
  - An examination of shafts and adits for bat colonies would be completed prior to earth-moving activities. If substantial use by bats is found, project activities would be restricted near the roost sites until the hibernating period had ended and the bats had left.
  - Other abandoned mine workings that do not pose a hazard to people would be left open or barricaded in a manner acceptable to BLM to permit animal ingress and egress.

- Ledges would be constructed in the mine pit walls for raptor nesting and roosting.

- Visual Resources
  - Outdoor lighting for mine pits and other areas of nighttime activities would be shielded to reduce fugitive light.
  - Site reclamation would include modification of final overburden and heap leach pile shapes to reduce the impact of straight-line geometrics and potential contrast in form and line.
  - Rock staining solutions would be used on the upper walls of the mine pits and on the Big Chief Hill clay pit. These solutions would be specifically colored to reduce the contrast between the pit walls and surrounding slopes.

2.6 EIS/EIR FORMAT

1. The contents of this EIS/EIR are arranged to provide a clear and accurate description of the proposed action and alternatives, the potential consequences of implementation, and the environmental evaluation process.

2. The EIS/EIR is organized under the following primary headings:

   - 1.0 Summary of the Proposed Action and Its Environmental Effects

     This chapter provides a summary of the major findings in this report. The proposed action and alternatives are described and compared for individual and cumulative impacts and mitigation measures.

   - 2.0 Introduction

     This chapter introduces the proposed action, explains the EIS/EIR process, including scoping, and provides a framework for understanding the complexity of regulatory compliance requirements associated with the proposed action.

   - 3.0 Description of the Proposed Action and Its Alternatives

     A detailed description of the proposed Castle Mountain Project is given. Alternatives to the proposed action which were considered are discussed.

   - 4.0 Description of the Existing Environment

     This chapter provides a baseline description of the natural and man-made environment which could be affected by the proposed action or its alternatives.

   - 5.0 Potential Environmental Impacts

     This chapter discusses the potential impacts resulting from implementation of the proposed action or its alternatives and evaluates their significance. Measures designed into the project by the Applicant to reduce or avoid environmental effects are evaluated.

   - 6.0 Mitigation Measures

     Measures to reduce or avoid potential impacts are proposed for consideration by the decision makers.

   - 7.0 Unavoidable Adverse Impacts

     Impacts which cannot be mitigated are discussed.

- 8.0 Cumulative Impacts

  Potential impacts of the proposed action are evaluated in conjunction with those of other foreseeable actions.

- 9.0 Other Required Considerations

  Short- versus long-term uses of the environment and commitments of resources required for implementation of the proposed action are discussed.

- 10.0 Terms and Abbreviations

  Terms are described as they are used in this document, and a list of abbreviations is provided.

- 11.0 Qualifications of Preparers

  This chapter identifies individuals and organizations who contributed to preparation of the EIS/EIR.

- 12.0 Organizations and Persons Consulted

  This chapter provides a list of individuals and organizations that have contributed data used or concerns to be addressed in the EIS/EIR.

- 13.0 References

- 14.0 Index

- Appendices

  A. Copies of the BLM Notice of Intent and County of San Bernardino Initial Study are included.

  B. A list of permits and approvals that would be necessary before full implementation of the action could be achieved is provided.

  C. Lists of vegetation and wildlife which are known to occur or expected to occur on or in the vicinity of the project site are provided.

  D. A list is included of agencies, organizations, and individuals to which this Draft EIS/EIR has been distributed.

  E. This appendix is a separate document that is on file and available for public review. It contains public scoping documentation: the BLM Notice of Intent, County of San Bernardino Initial Study, mailing lists, and comments received on these notifications from agencies, organizations, and individuals. A list of individuals that received the Draft EIS/EIR is included.

F. This appendix is a separate document that is on file and available for public review. It contains the application submitted to the San Bernardino County Air Pollution Control District for an Authority to Construct.

CHAPTER 3.0
DESCRIPTION OF THE PROPOSED ACTION AND ITS ALTERNATIVES

3.0 DESCRIPTION OF THE PROPOSED ACTION AND ITS ALTERNATIVES

3.1 INTRODUCTION

1. This chapter presents a comprehensive description of the proposed action and its alternatives. The proposed action, known as the Castle Mountain Project, is described in detail in subsequent sections of this chapter according to its site layout, major components, utilities, and operations. There also is a discussion of the reclamation plan that would be implemented. Reclamation is a regulatory requirement of the Federal Land Management Policy Act (FLPMA) and of the Federal Code of Federal Regulations (43 CFR 3809) administered by the U.S. Bureau of Land Management (BLM), and of the California Surface Mining and Reclamation Act (SMARA) administered by the County of San Bernardino. Procedures for reclamation are outlined in this chapter because they include measures that would mitigate many of the potential impacts of the proposed action.

2. The description provided herein represents the extent and location of activities that would take place at the site in order to implement the proposed project. Procedures to control minor changes, which may be necessary during final project design or in response to actual operation conditions, are provided for by the requirement that the Applicant enter into a formal Operating Agreement with BLM. Requirements and limitations of this agreement are described in Section 3.2.7, Operational Considerations.

3. Alternatives to the proposed action have been identified in accordance with National Environmental Policy Act and California Environmental Quality Act guidelines. Potential alternatives are described and evaluated for feasibility, including the No Action Alternative. Alternatives determined to be infeasible are not further considered in the environmental impact analysis sections. One feasible alternative was identified: the use of a different access route into the project site. As such, it would actually be a modification to the proposed action. That alternative is described in this chapter and is considered for its potential environmental impact in each subsequent section of this document. The required No Action Alternative is also described in this chapter and evaluated throughout the document.

4. The descriptions of the proposed action and alternative provide the basis for which the existing environment (Chapter 4.0, Description of the Existing Environment) is evaluated for potential impacts (Chapter 5.0, Potential Environmental Impacts). Definitions of mining and other terminology are in Chapter 10.0, Terms and Abbreviations.

5. This chapter has been organized for a description of the major project elements and operational considerations according to the following format:

- Introduction
- Project objective and need
- Project location
- Overview of proposed open pit heap leach mining operation
- Site plan and major components
- Utilities, ancillary structures, equipment, and supplies
- Project traffic and site access
- Operational considerations
- Reclamation
- Alternatives eliminated from detailed consideration
- Alternatives to the proposed action

3.2 PROPOSED ACTION

3.2.1 PROJECT OBJECTIVE AND NEED

1. The objective of the proposed action is to develop a commercial open pit mine using conventional heap leach processing to recover gold in a disseminated orebody. The ore would be processed at a rate of about three million tons per year.

2. The Castle Mountain Project is proposed as a private industry undertaking. Federal Government policies encourage private enterprise in the economic development of domestic mineral resources to help assure satisfaction of the nation's industrial and security needs (Mining and Minerals Policy Act, found in 30 U.S. Code Section 21).

3.2.2 PROJECT LOCATION

1. The proposed project is located in the Hart Mining District of San Bernardino County, about 100 miles east of Barstow, California, and about 70 miles south of Las Vegas, Nevada, as shown in Figure 3.2.1, Regional Location Map. Hart is an area of historic gold and clay mining activity on the southwest flank of the Castle Mountains in Lanfair Valley, as shown in Figure 3.2.2, Vicinity Map. This region of the Mojave Desert is managed by BLM as part of the California Desert Conservation Area (CDCA) and East Mojave National Scenic Area (EMNSA).

2. The project site is comprised of about 2,735 acres, encompassing approximately 2,620 acres of Federal lands administered by BLM and 115 acres of patented mining claims administered by San Bernardino County. As shown in Figure 3.2.3, Proposed Project Site, activities would occur in the southern half of Section 13 and portions of Sections 23, 24, 25, and 26, Township 14 North, Range 17 East, San Bernardino Baseline and Meridian (SBB&M).

3.2.3 OVERVIEW OF PROPOSED OPEN PIT HEAP LEACH MINING OPERATION

1. The proposed Castle Mountain Project would operate as an open pit heap leach mine, using established methods common to this industry. The process typically used to recover gold by heap leaching methods is depicted as a block diagram in Figure 3.2.4, Generalized Heap Leach Mining Operation.

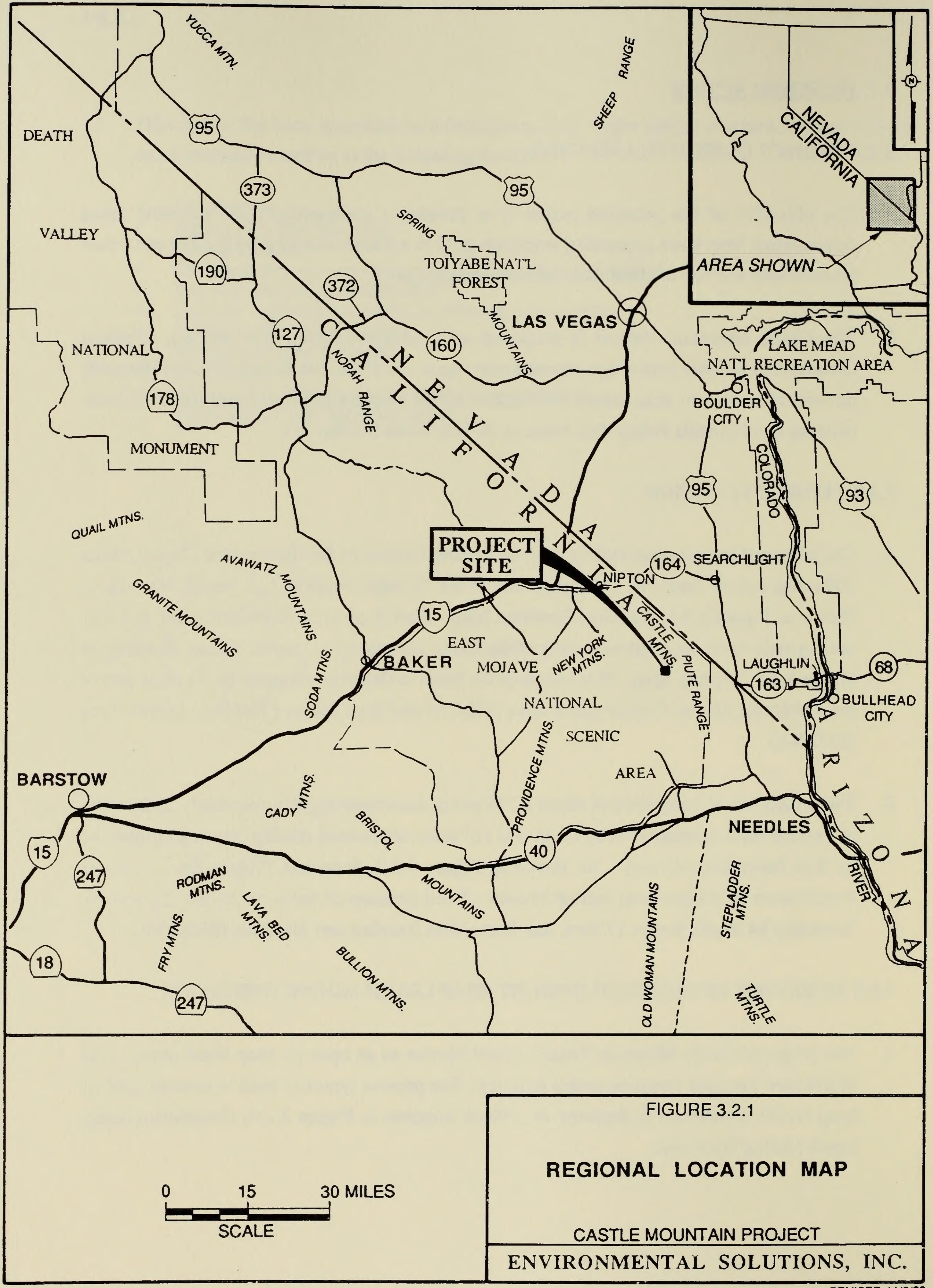


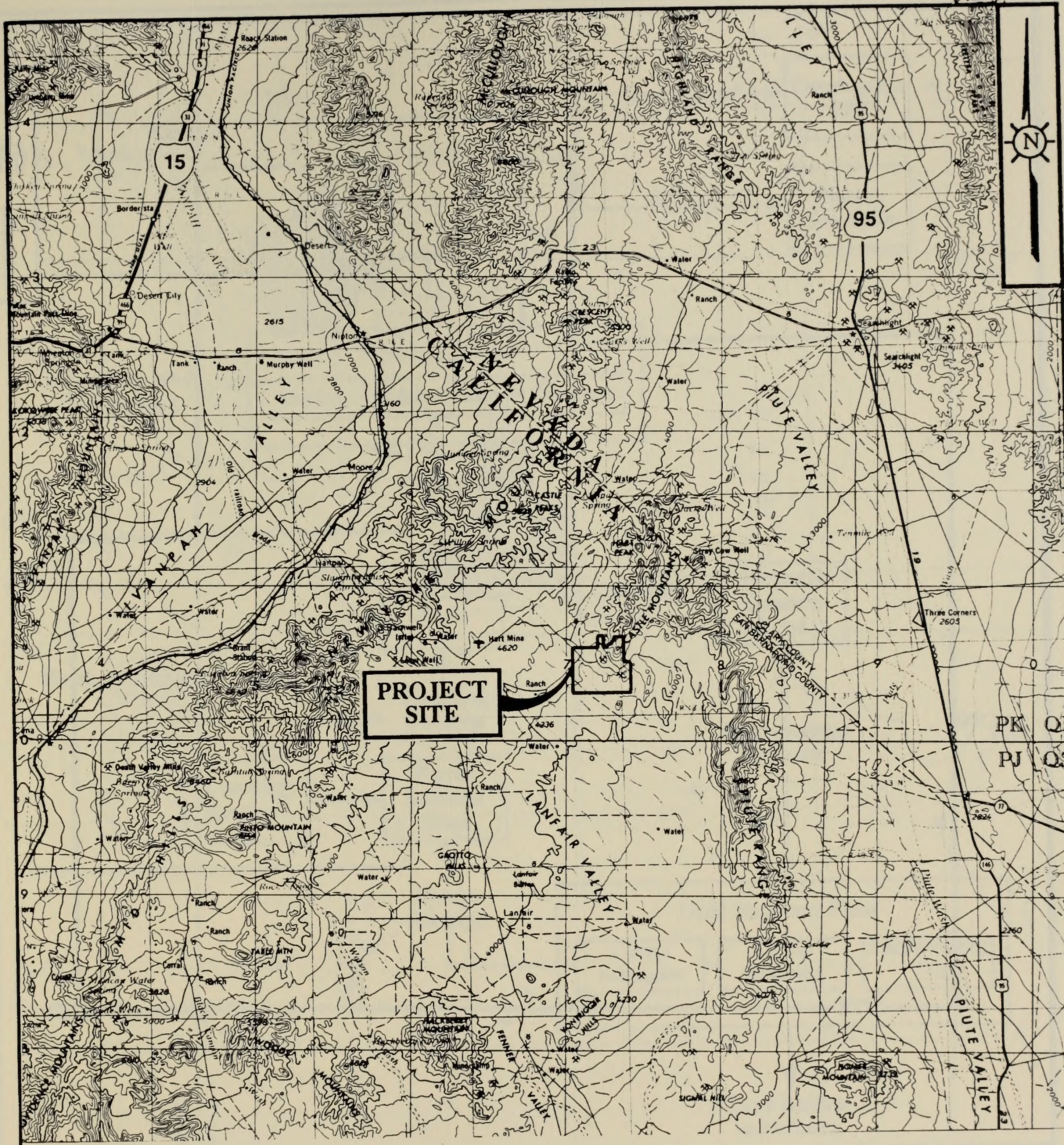
FIGURE 3.2.1

REGIONAL LOCATION MAP

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 11/8/88



0 6 12 MILES

SCALE

CONTOUR INTERVAL: 50 METERS

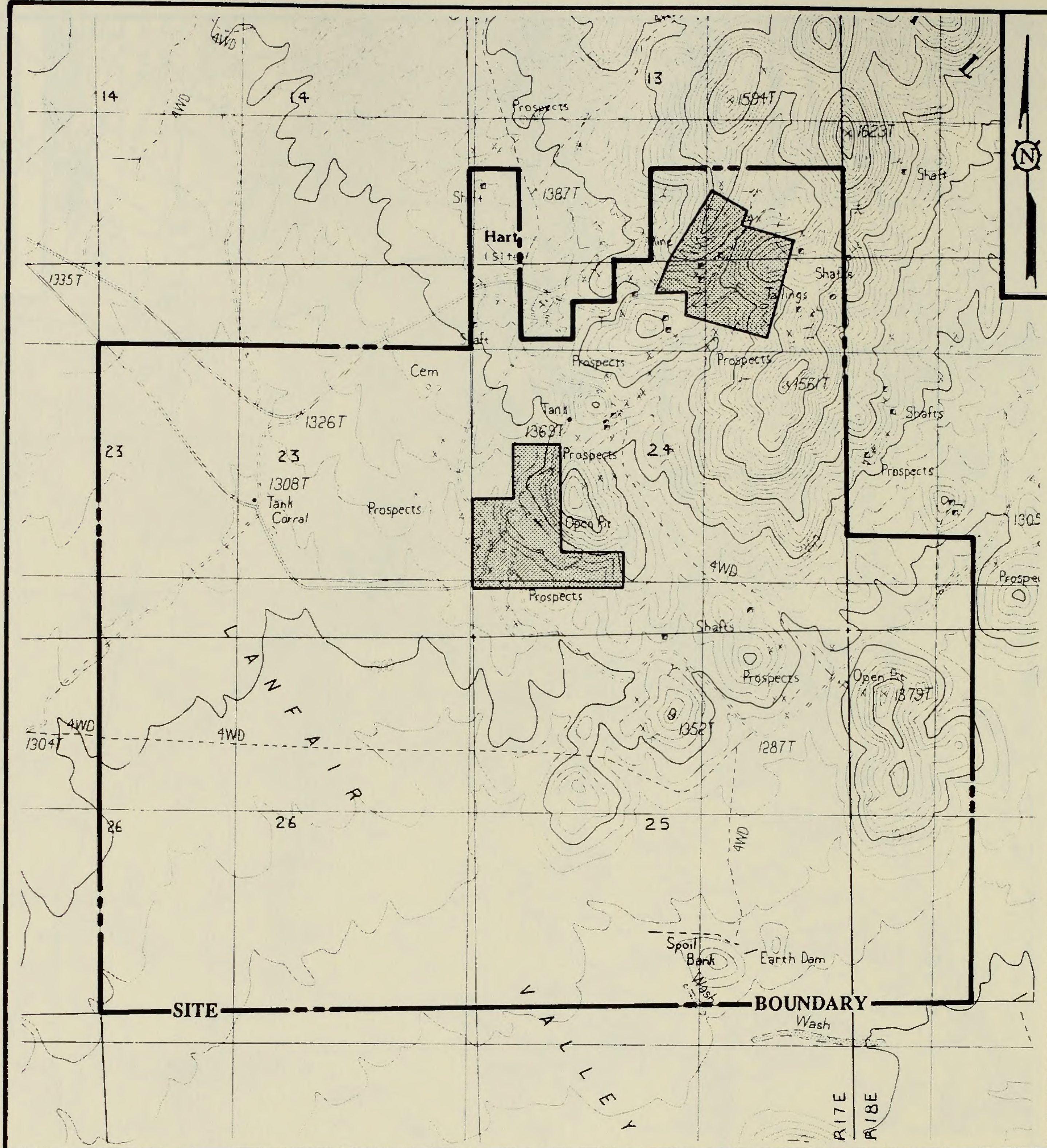
REFERENCE: U.S.G.S. TOPOGRAPHIC V502 SERIES MAP - NI 11 - 3 BASE OF KINGMAN, ARIZONA-NEVADA-CALIFORNIA DATED 1954 AND REVISED 1969

FIGURE 3.2.2

VICINITY MAP

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

- BLM - ADMINISTERED LAND (2,620 ACRES)
- PATENTED LAND (115 ACRES)

LEGAL DESCRIPTION:

T. 14 N, R. 17E, SBB&M
SEC. 13: S 1/2 OF SE 1/4 AND W 1/2 OF SW 1/4 OF SW 1/4
SEC. 23: ALL, EXCEPT N 1/2 OF N 1/2
SEC. 24: ALL, EXCEPT E 1/2 OF NW 1/4 OF NW 1/4, AND NW 1/4 OF NE 1/4 OF NW 1/4
SEC. 25: ALL; SEC. 26: ALL

T. 14 N, R. 18E, SBB&M
SEC. 19: SW 1/4 OF SW 1/4
SEC. 30 W 1/2 OF W 1/2

0 .5 1 MILE
SCALE

FIGURE 3.2.3

PROPOSED PROJECT SITE

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

88/148GeCo3.2.4

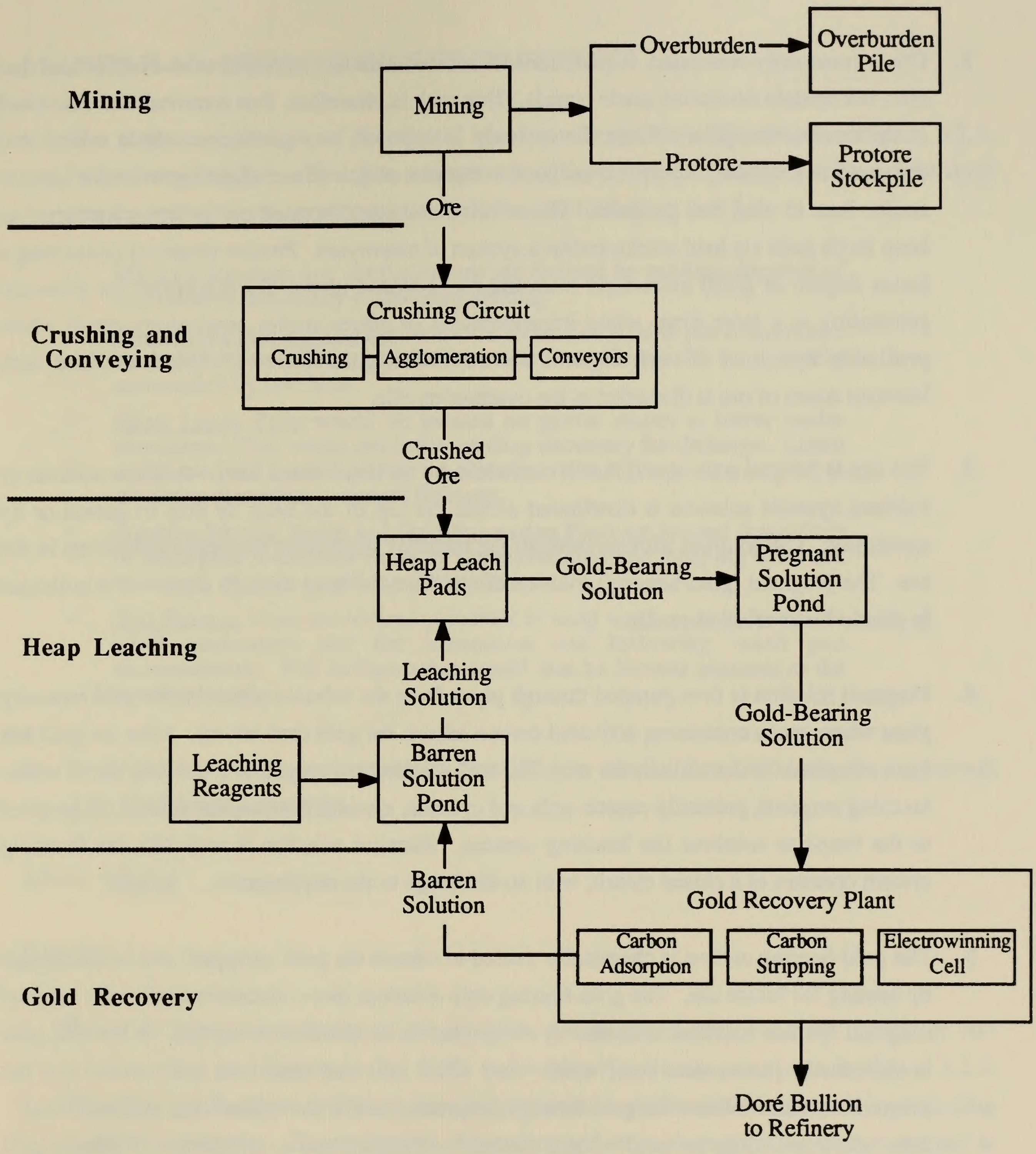


FIGURE 3.2.4

GENERALIZED HEAP LEACH MINING OPERATION

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 2/20/89

2. Ore is commonly concealed, in part, beneath rock or alluvium (referred to as overburden) that does not contain economic grade metals. This rock is, therefore, first removed and discarded at the overburden pile. When the orebody is exposed, ore grade material is mined and delivered to a crusher, where it is reduced to the size of gravel and agglomerated with cement and/or lime to bind fine particles. The crushed and agglomerated ore is then transported to heap leach pads via haul trucks and/or a system of conveyors. Protore (material containing a lesser degree of gold) excavated from the pit is stored in protore stockpiles for potential processing at a later time, when improvements in prices and/or technology could allow profitable treatment of such material for additional gold recovery. Unmineralized rock between zones of ore is discarded at the overburden pile.

3. The ore is heaped onto a pad that is underlain by an impervious liner. A dilute sodium or calcium cyanide solution is distributed across the top of the heap by drip irrigation or by sprinkling. The solution trickles through the material, dissolving the gold (and silver) in the ore. The pregnant (gold-bearing) solution drains from the heap through pipes and is collected in plastic-lined solution ponds.

4. Pregnant solution is then pumped through pipes from the solution ponds to the gold recovery plant where tanks containing activated carbon adsorb the gold (and silver). After the gold has been adsorbed on the carbon, the now "barren" solution is pumped to a holding basin, where leaching reagents, primarily caustic soda and cyanide, are added before the solution is recycled to the heaps to continue the leaching process. Because solution is recycled, the leaching system operates as a closed circuit, with no discharge to the environment.

5. The gold-bearing carbon is chemically treated to release the gold (stripped) and is reactivated by heating for future use. The gold-bearing strip solution, more concentrated than the original pregnant cyanide solution, is treated by electrolysis in an electrowinning cell. In the cell, gold is electrically plated onto steel wool. Any silver that was dissolved and carried into the pregnant solution follows the gold through the process and is also plated onto the steel wool. After electrowinning, the steel wool is melted in a furnace, and a doré (or bar of impure gold and silver) is produced. The doré is then sold or shipped to a refinery for further purification.

6. This generalized process description is presented in greater detail in the following sections as it would be adapted to the Castle Mountain Project.

3.2.4 SITE PLAN AND MAJOR PROJECT COMPONENTS

1. The major components of the Castle Mountain Project are illustrated in Figure 3.2.5, Preliminary Site Plan. This plan arrangement of the major components has been developed based upon numerous considerations, including the following:

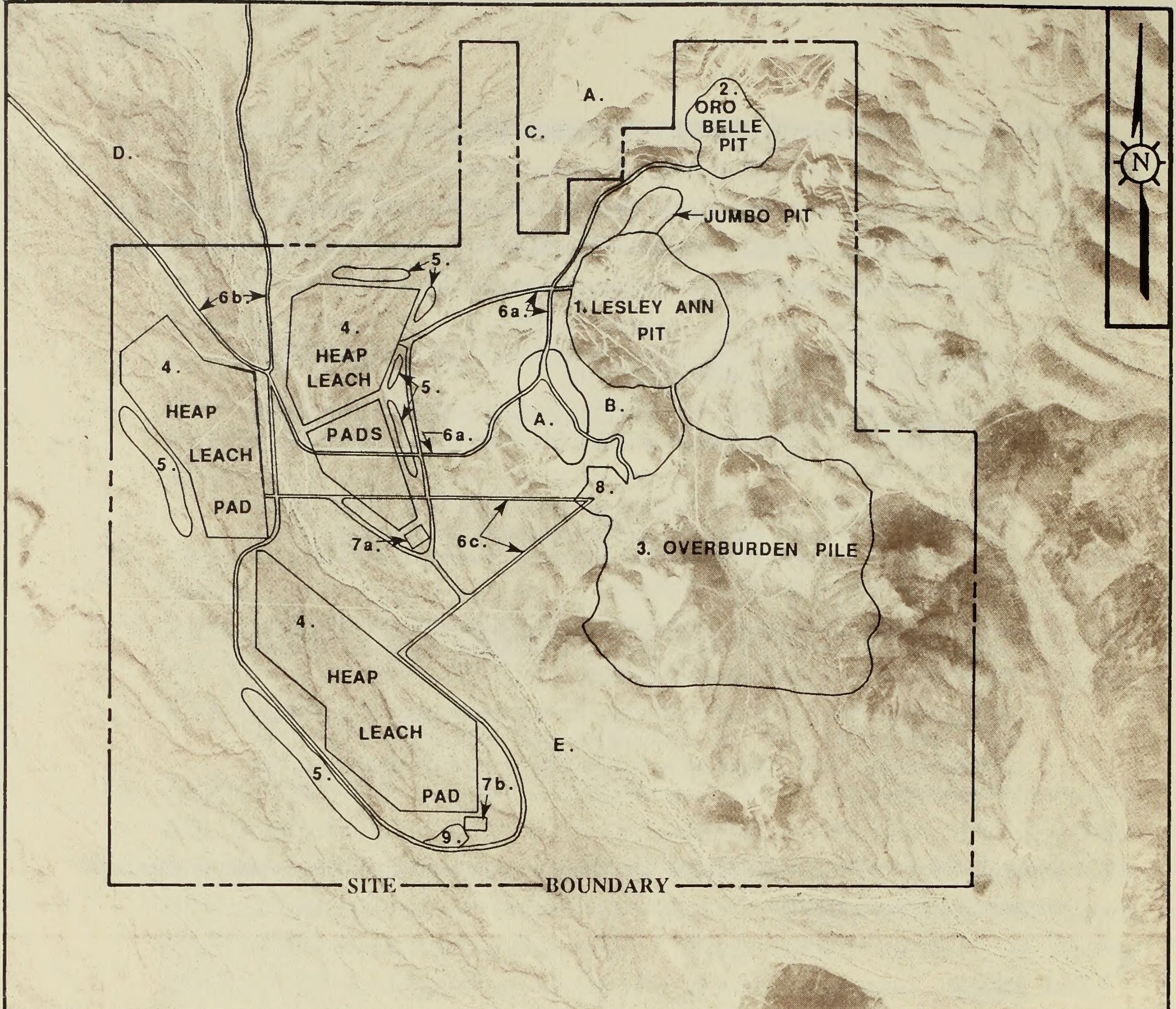
   - Mine Pit locations and configurations are dictated by geologic location of orebodies as defined by exploratory drilling.
   - Overburden Pile and Crusher would be located near mine pits to minimize haul distances. The proposed overburden pile would be partially surrounded by low hills.
   - Heap Leach Pads would be located on gentle slopes at lower onsite elevations. This would minimize grading necessary for drainage. Leach pads have been located outside the primary onsite drainage area in order to minimize disruption to natural drainage.
   - Solution Storage Ponds and Gold Processing Plant are located downslope of leach pads so solution flows by gravity, minimizing pumping costs and the length of pipes handling solution flow.
   - Soil Storage areas are located proximal to heap leach pads to minimize earth movement and for immediate use following leach pad decommission. Soil storage areas would also be located adjacent to the overburden pile.

2. Each of these major components is described in detail below with respect to planned characteristics and operation.

3.2.4.1 Mining

Mine Pits

1. Based on current knowledge of the deposits, the proposed project would consist of two primary mine pits, known as Oro Belle and Lesley Ann/Jumbo, as shown in Figure 3.2.5. The sizes and locations are based on current estimates of potential size from the continuing exploration program. The anticipated dimensions and other characteristics are summarized in Table 3.2.1, Estimated Mine Pit Characteristics. The ultimate pit configurations are subject to developmental design decisions, as well as metallurgical parameters and market conditions.



MAJOR FACILITIES SUMMARY

FACILITY	ACREAGE
1. LESLEY ANN/JUMBO PITS	100
2. ORO BELLE PIT	35
3. OVERBURDEN PILE	300
4. HEAP LEACH PADS	330
5. SOIL STORAGE	70
6. ROADS	30
a. HAUL ROADS	
b. ACCESS ROADS	
c. CONVEYORS/HAUL ROADS	
7. SOLUTION PONDS	10
a. PREGNANT AND INTERMEDIATE	
b. PREGNANT, INTERMEDIATE AND BARREN	
8. CRUSHING AREA	10
9. PROCESSING PLANT AREA	5
PROCESS BUILDING, ADMINISTRATION BUILDING, PARKING, WAREHOUSING	
TOTAL	890

SITE FEATURES

A. CLAY PIT
B. BIG CHIEF HILL
C. HART (TOWNSITE)
D. HART MINE ROAD
E. DRAINAGE WASH

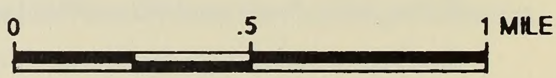


FIGURE 3.2.5

PRELIMINARY SITE PLAN

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TABLE 3.2.1

ESTIMATED MINE PIT CHARACTERISTICS

DIMENSION	MINE PITS [1]	
	ORO BELLE	LESLEY ANN/ JUMBO
Area	30 to 40 acres	90 to 110 acres
Length (north-south)	1,300 to 1,600 feet	2,200 to 2,600 feet
Width (east-west)	1,300 to 1,500 feet	2,100 to 2,500 feet
Maximum depth	200 feet	600 feet
Minimum anticipated ore reserves	7 million tons [2]	13 million tons [2]
Estimated possible additional ore and protore resources [3]	2 million tons	8 million tons
Approximate overburden volume	10 million tons	50 million tons

(1) For the Lesley Ann and Oro Belle deposits, the minimum values for pit dimensions are based on known proven or probable ore reserves. The maximum values shown for pit dimensions are based on preliminary engineering projections that include possible mineralization and protore volumes. Definition drilling and final engineering based on initial pit excavation experience will be used to determine the final size and configuration of the pits.

(2) Based on the current status of drilling to delineate ore reserves and engineering design of the ore deposits, the minimum anticipated volume of ore shown for the Lesley Ann/Jumbo South pit is considered to be proven reserves. The minimum volume shown for the Oro Belle pit is considered to be probable reserves.

(3) Possible additional ore and protore resources for both pits are based upon geologic interpretation of drilling data that indicates the presence of mineralization. Protore volumes within the Lesley Ann/Jumbo pit (i.e., material that may become economic in the future) are included in this category.

Mining Operations

1. Conventional open pit mining methods would be used. These are illustrated in Figure 3.2.6, Mining and Crushing Operations Diagram, and encompass:

   - Drilling and blasting to loosen and fragment overburden and ore.
   - Excavating and loading overburden and ore into haul trucks for removal from the mine pit.
   - Transporting overburden and ore to the overburden pile, protore stockpiles, or crusher for processing.

   Some near-surface gravels that cover the orebodies may not require use of explosives. It is expected, however, that most rock would be drilled and blasted, then loaded by shovel or front-end loader into haul trucks (50- to 100-ton capacity). Haul trucks would remove overburden and ore from the pit via haul roads to the overburden pile, protore pile, or crusher.

2. Dust control measures would be implemented as part of mining operations. Haul roads would be sprayed with water as required to control fugitive dust. Surfactants, or chemical binders, would be added to the dust suppression water to provide longer term dust suppression and to reduce water use, or if water alone does not achieve the desired effect.

3. Blasthole drilling would use either rotary or percussion blasthole drills. It is anticipated that mining activities would use three general types of explosives: (1) ammonium nitrate/fuel oil mixture (ANFO), (2) water-resistant slurries, and (3) dynamite and boosters. Explosives and detonators would be stored in an approved magazine located onsite. Use of explosives would be limited to daylight hours,

4. Based upon current estimates of known reserves and potential resources, it is expected that up to 30 million tons of ore and about 60 million tons of overburden would be mined. The amount of material mined and the manner of distribution (as ore, protore, or overburden) would depend upon economics. It is anticipated that, within the defined project site, ore grade material may ultimately be as much as 40 million tons. Reclassification of potential resources as ore grade material would be dependent upon favorable economics, which would enable processing of protore and lower grade mineralization, as well as delineation of additional deposits as the pits are developed. Changes to the proposed design would be subject to review and approval of the County and BLM in accordance with the Operating Agreement (see Section 3.2.7.1) and applicable agency regulations.

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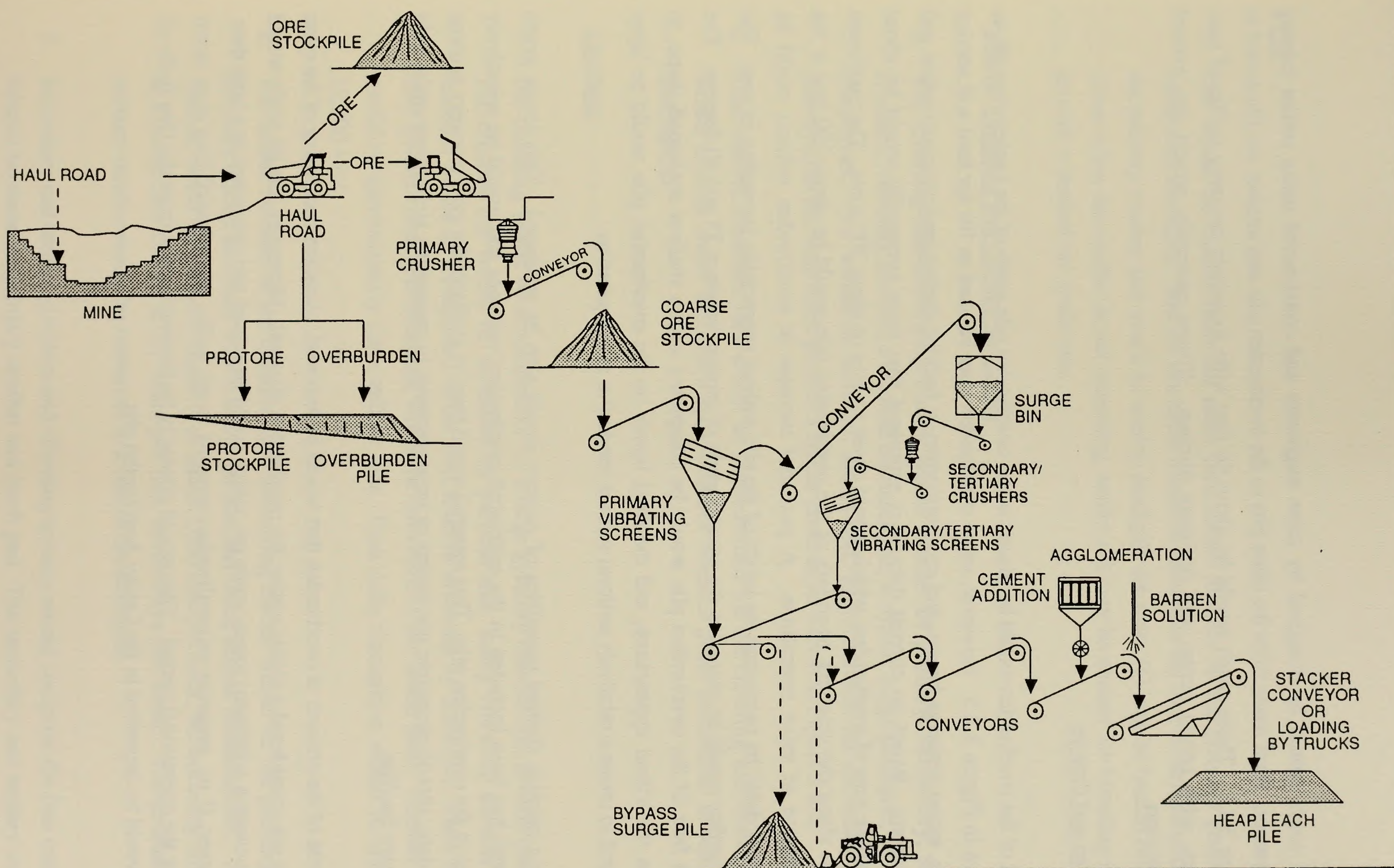

FIGURE 3.2.6

MINING AND CRUSHING OPERATIONS DIAGRAM

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5. Haul roads would be designed by mine engineers and constructed using onsite mining equipment. Haul roads from the mine pits to the overburden pile and crusher are illustrated in Figure 3.2.5. These roads would be about 60 feet wide to permit two-way traffic of haul trucks, with safety berms and drainage ditches. Slopes generally would not exceed 10 percent.

Overburden and Protore

1. Most of the overburden would be placed in the overburden pile south of the Lesley Ann pit, as shown in Figure 3.2.5. However, some overburden may be used as fill for haul and service roads, storm drainage berms, and crusher/conveyor backfill during project construction and operations. Based on current data, it is estimated that there eventually would be about 60 million tons of overburden, which would cover an area of about 300 acres. The maximum height along the southern boundary of the overburden pile would be about 200 feet at the conclusion of mine operations. A potential increase in overburden volume could be accommodated by increasing the height of the pile without appreciably increasing its area. The overburden would be placed at the natural angle of repose, between 35 and 40 degrees. The south face of the overburden pile would be completed with a shallow scalloped shape, to soften the visual appearance, and the final layers on the overburden pile would be layer dumped to create a relatively uniform surface conducive to revegetation.

2. During mining, limited quantities of protore would also be produced. This lower grade material has been included in the estimated overburden volumes and would be selectively placed in the overburden pile. This material would then be available for gold recovery at some later date, should economic conditions or improvements in processing technology make gold recovery feasible.

3. Because of the amount of overburden that would be removed, complete backfilling of the mine pits is not considered a viable option for overburden disposal. Moreover, the pit walls would likely contain additional lower grade ore which could be mined and processed at a later date. However, if no apparent mineralization remains in pit walls, some backfilling may occur during the operational period. This would primarily be for overburden from the Oro Belle pit that would be deposited in the Lesley Ann/Jumbo pits.

Ore

1. Ore would be hauled from the mine pits, either directly to the primary crusher or to a temporary stockpile. The ore stockpile would be located in the overburden disposal area near the primary crusher and would be used to stockpile ore that: (1) may be hauled from the pit at times when the crusher is not operating, and/or (2) may be needed for blending purposes to provide a desired ore grade mix.

3.2.4.2 Crushing and Conveying Circuit

1. The crushing and conveying circuit would consist of primary, secondary, and tertiary crushers, vibrating screens, a crushed ore stockpile, a bypass surge stockpile, and a series of conveyors. Ore would be crushed, stockpiled, agglomerated (as necessary), and then conveyed to the heap leach pads in a staged process, as shown in Figure 3.2.6.

2. Dust control measures that would be implemented for the crushing and conveying circuit would include water surfactant sprays and/or transfer point enclosures acceptable to the SBCAPCD.

Crushers

1. Ore crushing would be accomplished by a large gyratory crusher and several cone crushers. The crushed ore would be separated by particle size, using vibrating screens. Oversize material would be transported to the next level of crushing by conveyor, while ore meeting final product size specifications would be conveyed to the leach pads. Annual throughput would be approximately three million tons. Peak daily throughput would be approximately 11,000 tons.

2. The initial element of the crushing and conveying circuit would be the primary crusher, a partially buried structure with a dump pocket and truck access embankment. The primary crusher would have a rated capacity of about 2,000 tons per hour, but normally would operate at a lower rate for up to 20 hours per day, seven days per week. The product from this primary crusher would be conveyed to a coarse ore stockpile.

3. Secondary and tertiary crushers and vibrating screens would comprise the fine crushing plant, located between the primary crusher and leach pad. The secondary and tertiary crushers each

would have a rated capacity of about 500 tons per hour. These crushers are expected to operate 24 hours per day, seven days per week. They would have the capacity to reduce the ore to less than 3/8-inch in size. The actual extent of crushing would be based on specific metallurgical characteristics, and the different types of ore-bearing rock would be blended during crushing operations to optimize efficiency during gold recovery.

4. A surge bin would be incorporated into the circuit to provide a relatively uniform rate of ore feed to the secondary and tertiary crushers (see Figure 3.2.6). The surge bin is expected to have a capacity of about 100 tons.

Conveyors

1. A series of conveyors would transport the ore through the various crushing stages and move the crushed ore overland from the crushers to the heap leach pads (see Figure 3.2.6). Portable conveyors and a radial stacker would be used for placing crushed ore onto the heap leach pads. It is anticipated that the system initially installed would include about 4,000 feet of overland conveyors, with an optimal delivery capacity of about 400 to 500 tons per hour.

2. Haul trucks would also be used to transport crushed ore to the heap leach pads. These trucks would place the ore directly on the top of the heap. In the later stages of heap development, haul trucks may replace the conveyor system for ore transport.

Crushed Ore Stockpiles

1. A primary crushed ore stockpile would be located adjacent to the primary crusher and would receive ore from the crusher via conveyor. This stockpile would have a "live storage" capacity of between 5,000 and 10,000 tons and a total capacity of about 15,000 tons. The ore in this stockpile subsequently would be reclaimed by vibrating feeders located beneath the stockpiles. The ore would be fed by conveyor to the fine crushing plant.

2. A small bypass surge pile would be located along the overland conveyor system between the crushing plant and the leach pads. It would be used when the portable conveyors and radial stacker on the leach pads need to be shut down for maintenance or relocation to a different

position on the leach pad. This stockpile would have a capacity of about 2,000 tons. Material would be reclaimed from this stockpile using a front end loader feeding a hopper unit on the conveyor system.

Agglomeration

1. Within the crushing and conveying system, a process of agglomeration would be used in the event leaching efficiency could be improved by reducing the number of fine grained particles. Agglomeration is the process of using lime or cement and water to attach fine particles to larger pieces of rock. The agglomeration process being planned includes provision for adding a dilute sodium or calcium cyanide solution (barren solution) to enhance the rate of gold extraction from the ore. Agglomeration would be accomplished in areas underlain with impervious liners designed in accordance with California Regional Water Quality Control Board (RWQCB), Colorado River Basin requirements to prevent contamination of soils by barren solution.

3.2.4.3 Heap Leach System

1. The primary elements of the heap leach system are the heap leach pads, solution storage ponds, and piping systems to distribute and circulate the leaching solution. This system is illustrated in Figure 3.2.7, Heap Leach Process Diagram. Facilities and operation of the heap leach system are described in the following two sections.

Heap Leach Facilities

1. The heap leach pads and ponds would be located on the valley floor in the southwestern portion of the project site (see Figure 3.2.5.) A large drainage passes through this westerly portion of the project site. Individual leach pads would be located on natural terraces some 10 to 12 feet above this drainage and designed so as not to interfere with intermittent flows in the drainage. Run-off from infrequent large storms that could occur in the area would, therefore, not present a hazard to the physical integrity of the leach pads or other processing facilities.

2. Based on estimates of ore quantities and heights of leach heaps, the pads would eventually cover an area of about 330 acres. Each heap would be constructed in multiple lifts, as shown in Figure 3.2.7. Ultimate heights of about 80 feet above ground level are planned. The pad areas shown in Figure 3.2.6 could accommodate up to 40 million tons of ore. If the quantity

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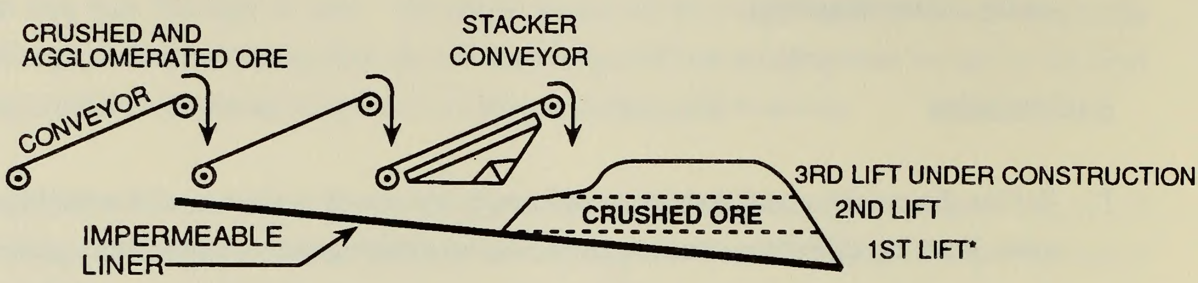
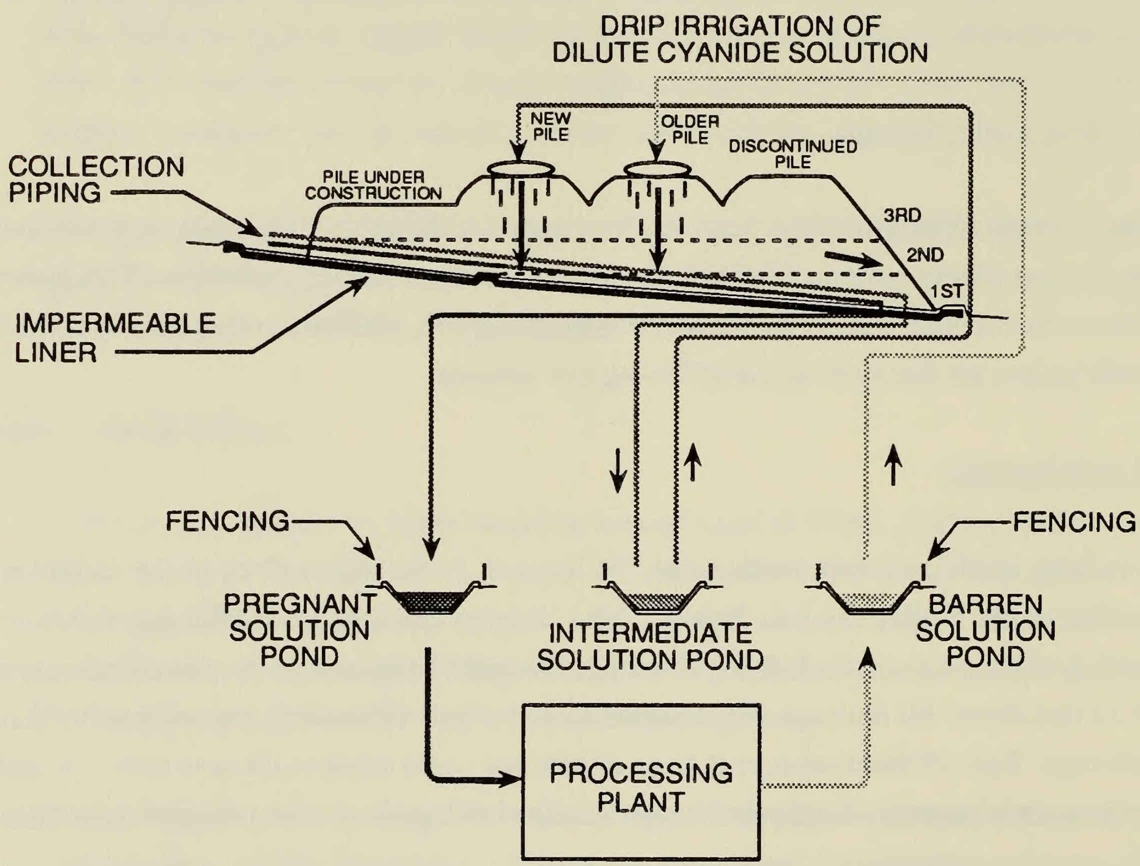
HEAP LEACH PILE CONSTRUCTION



HEAP LEACHING



*NOTES

1. PILES MAY ALSO BE CONSTRUCTED WITH TRUCKS AND DOZERS.)
2. HEAPS ARE CONSTRUCTED IN A SERIES OF LIFTS, EACH LIFT BEING APPROXIMATELY 15 TO 20 FEET IN HEIGHT.

FIGURE 3.2.7

HEAP LEACH PROCESS DIAGRAM

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of ore were to exceed 40 million tons, or if heap heights are restricted to less than 80 feet because of leaching characteristics, the pad areas could increase proportionately. In such circumstances, additional pad areas required would be contiguous to those shown in Figure 3.2.5 and would be constructed to avoid disturbance to the existing large drainage. Changes to the pad area would be subject to BLM review, in accordance with a proposed operating agreement (see Section 3.2.7.1, Operating Agreement).

3. In addition to multiple lifts, each heap leach pad would be constructed in segments, according to the rate of ore processing. Leach pads would be designed and constructed concurrent with mining and crushing operations, by grading and compacting soil over which an impermeable liner is placed. The liner would be designed to satisfy requirements of the RWQCB. Solution used on the heap leach pads would be drained by a system of piping that would discharge into one of several solution ponds.

4. Three types of solution ponds would be used. The pregnant pond would hold the gold-laden solution for processing. The barren pond would contain solution used for primary applications to the heap. The intermediate pond would contain solution for secondary applications to the heap. Solution ponds would be double-lined and have seepage collection, removal, and leak detection monitoring capabilities, as approved by RWQCB. Ponds would be located in two locations at the downslope end of the heap leach pads, as shown in Figure 3.2.5. The easterly pond site would include intermediate and pregnant ponds, while the westerly pond site would contain a barren pond, as well as intermediate and pregnant ponds. Preliminary pond design characteristics include the following:

Pond Type	Quantity	Maximum Depth (feet)	Dimension (feet)	Capacity (gallons)
Intermediate	2	20	200 x 170	2 million
Pregnant	2	20	200 x 170	2 million
Barren	1	15	370 x 215	5 million

Final design would include provisions to control access to the ponds by both humans and wildlife. Chain link fencing would surround each pond area. The ponds would also be covered with netting or other suitable covering acceptable to BLM to deny access to birds and bats. These and other wildlife protection measures are further described in Section 3.2.7.4, Wildlife and Livestock Protection.

5. Ponds would be designed with sufficient capacity to accommodate large rainfalls and would be interconnected so that storm drainage from the pregnant and intermediate solution ponds could overflow via lined ditches into the larger, barren solution pond.

Heap Leach Process

1. Ore would be distributed to the heap leach pads by the system of portable conveyors and a radial stacker as described above, augmented by haul trucks and bulldozers. As illustrated in Figure 3.2.7, ore would be stacked in layers, or "lifts," which normally vary in thickness from about 15 feet to more than 20 feet. Lifts with greater thickness may be used on a trial basis in order to obtain the optimal configuration for leaching.

2. Once each layer of fresh ore is in place, a recently developed drip irrigation system would be installed to distribute barren or intermediate solution across the top of the heap. The solution would percolate through the gold-bearing ore, dissolving gold and silver. Benefits of the drip irrigation method over conventional sprinkler systems include improved wildlife protection due to less surface ponding, reduced water evaporation and reduced loss of reagents by oxidation. Use of conventional sprinklers would be limited to the sides of the heaps, in areas where no ponding could occur.

3. Application rates of leach solutions would vary, depending upon ore characteristics and percolation rates. Those typically used in the gold mining industry range from about .002 to .007 gallons per minute (gpm) per square foot. The gold-laden solution would be collected at the bottom of the pad by a network of perforated gathering pipes laid on top of the impermeable liner. These slotted pipes would drain into large pipes, which would carry the solution to the storage ponds.

4. The heap leach operation would be configured for two leach cycles, primary and secondary. The first (primary) application of solution would be to fresh ore over an estimated period of about 30 to 120 days. Secondary (intermediate) applications would be to previously leached ore. Multiple "secondary" applications could occur to recover additional gold. The actual number of leach cycles would be determined relative to operational considerations and the characteristics of the particular ore being leached. The total amount of solution recirculated over the heap leach pads would be about 1,500 gpm for each of the primary and secondary circuits.

5. Three types of solution storage ponds would be used. The barren solution pond would contain solution discharged from the processing plant prior to recycling for secondary leaching applications. The intermediate solution pond would contain solution from secondary applications to the heap. The pregnant solution pond would store gold-bearing solution from primary applications to the heap prior to removal to the processing plant for gold recovery. As shown in Figure 3.2.7, solution from the intermediate pond would be the first (primary) solution used on a leach pad. This solution would become heavily gold-bearing as it passed through fresh ore, and would be stored in the pregnant solution pond. Solution from the barren pond would be used for the secondary leaching application. This barren solution would dissolve additional gold and would be stored in the intermediate pond.

6. Heaps may be allowed to lie dormant between leaching cycles. Such "resting" periods often enhance gold recovery. After the final lift had been fully leached, a rinse cycle would occur, using fresh or conditioned water to reduce residual cyanide content to levels acceptable to the RWQCB. After the rinse cycle, the pile would be abandoned according to procedures required by BLM and RWQCB, and reclamation procedures would be initiated.

7. The entire heap leach process would be designed as a zero-discharge system, and solutions would be recycled. Makeup water would be required to compensate for evaporation losses and moisture retention.

3.2.4.4 Gold Recovery Plant

1. The gold recovery plant would receive and process gold-laden solution from the pregnant solution pond. Gold would be extracted from solution by an adsorption process using activated carbon, as shown in Figure 3.2.8, Generalized Gold Recovery Plant Process Diagram. The barren solution resulting from this process would be returned to the barren solution storage pond for reuse. The gold recovery plant and process used are described in the following two sections.

Plant Characteristics

1. The gold recovery plant would be an open-sided structure built on a concrete pad. This facility would be located near the south end of the westerly heap leach pad, approximately as

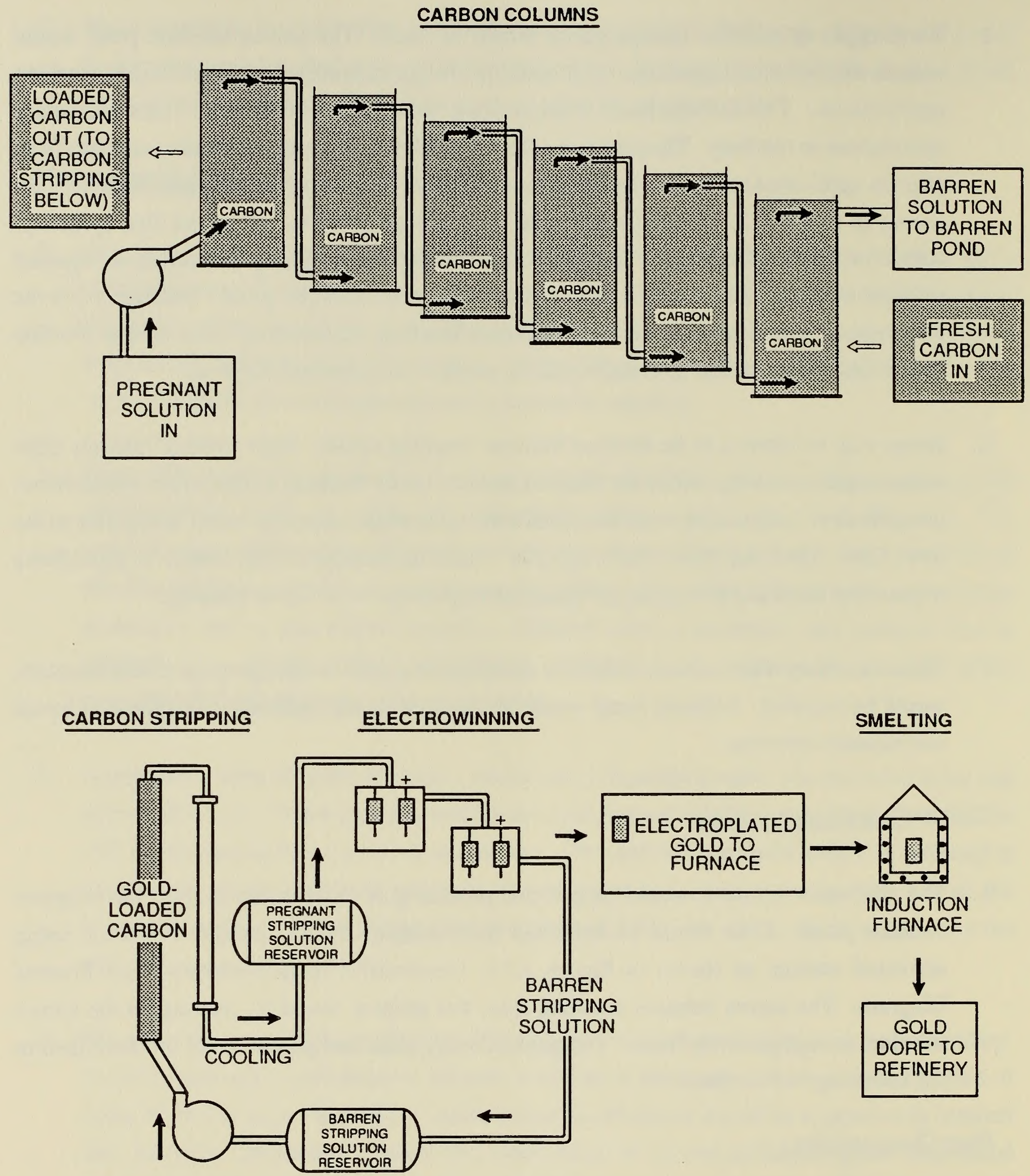

FIGURE 3.2.8

GENERALIZED GOLD RECOVERY PLANT PROCESS DIAGRAM

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shown in Figure 3.2.5. The plant would have curbs and a sump for fluid containment and collection. The basic components of the gold recovery plant would include:

- Carbon adsorption columns, to remove gold from the pregnant solution.
- Stripping columns, where the gold would be recovered from the carbon.
- Carbon reactivation and sizing facilities where the spent carbon would be prepared for reuse in the extraction processes. These would include an acid wash tank, reactivation kiln, and screens for sizing control.
- Bullion preparation area where electrowinning and furnace processes are used to produce gold suitable for shipment. Slag from this process would be packaged for shipment to an offsite smelter.

2. Ancillary facilities at the gold recovery plant include storage areas for reagents such as caustic soda, sodium or calcium cyanide, acid, activated carbon, calcium hypochlorite, lime, and cement. Each reagent would be stored according to accepted procedures, as may be required by the Mine Safety and Health Administration (MSHA) or other agencies. Areas where hazardous liquids are used or stored would be curbed or diked to contain potential spills and provide separation.

<u>Gold Recovery Process</u>

1. The carbon stripping process involves use of carbon columns to remove gold from leaching solution, stripping columns to remove gold from carbon, and electrowinning tanks where gold would be removed from solution by electroplating. Carbon columns would receive pregnant solution from the heap leach operation. In each column system, the solution would be pumped upward through the highest column and then would flow by gravity to the next lower column. The gold attaches to the carbon, thereby removing it from solution. Carbon is advanced in intervals to the next higher column. Carbon from the highest column (the most gold-laden) would be advanced to the carbon stripping facility. The cyanide solution from which the gold has been removed would be recycled to the barren solution storage pond.

2. The gold-laden carbon would be pumped to an acid wash tank into which dilute hydrochloric or nitric acid would be circulated. In the acid-wash step, any scale buildup on the carbon would be dissolved. At the conclusion of this step, the carbon would be rinsed with caustic to return the pH to neutral or slightly alkaline. The neutralized solution that forms when the caustic rinse solution mixes with the acid wash solution would be pumped to the barren pond. The acid wash area would be constructed on a concrete pad equipped with a sump to contain potential spills.

3. The gold-laden carbon would be discharged into insulated pressure vessels (strip columns) where a hot, strong caustic cyanide solution would strip the gold from the carbon. The stripping solution would then pass through a heat exchanger to be cooled below 212 degrees Fahrenheit, then stored in a holding tank (see Figure 3.2.8). This cooled solution would flow through electrowinning cells, where gold would be electrically plated onto steel wool. The gold-laden wool would be melted in a furnace, producing a doré bar (bar of impure gold and silver). The filtrate from the electrowinning operation would be recycled through the stripping circuit.

4. The stripped carbon would be dewatered and fed into a carbon reactivation kiln where it would be dried and heated to temperatures of 1,200 to 1,500 degrees Fahrenheit. The kiln would discharge to a quench tank, then to a carbon sizing screen where fresh, conditioned, makeup carbon would be added. The reactivated carbon would then be returned to the carbon columns for reuse.

3.2.4.5 Soil Storage

1. Areas for stockpiling of soils have been located adjacent to major facilities, as shown in Figure 3.2.5. Soils with characteristics determined to be of value for revegetation efforts would be removed and stored in these locations as facilities are developed. Following completion of activities over an area, soil would be recovered from storage and redistributed on the disturbed area in accordance with the reclamation plan. A program to develop site-specific revegetation procedures is discussed in Section 3.2.8.2, Reclamation Plan.

3.2.5 UTILITIES, ANCILLARY STRUCTURES, EQUIPMENT, AND SUPPLIES

1. Construction and operation of the Castle Mountain Project would require ancillary buildings for equipment, maintenance, operations, administration, and warehousing plus storage for equipment and supplies. Because the project site is in a relatively remote location, utilities such as water, power, and communications, and services such as sewage and waste disposal, security, and emergency response, would be provided and maintained by the Applicant.

2. Figure 3.2.9, Preliminary Utilities Plan, depicts the anticipated layout of water lines, power lines, onsite roads, and the locations of utilities equipment, including generators and water tanks. These facilities, and major project equipment and supplies, are described in the following sections.

3.2.5.1 Water Requirements and Supply

1. Water for the Castle Mountain Project would be needed primarily for the heap leach process and for dust control. Various alternatives for supplying the water requirements were evaluated (see Section 3.3.3, Alternative Water Supply). It was determined that provision of project water from local wells would be the most feasible method.

2. Previous project water estimates were in excess of 1,140 acre-feet per year, most of which would have been used in the heap leach process. The project plans for the heap leach process have since been modified to employ a solution distribution system using drip irrigation. The anticipated reduction in evaporation using this method would reduce project water requirements to an average of about 725 acre-feet per year (about 450 gpm). Actual daily water requirements would vary throughout the year due to changes in temperature and evaporation. Anticipated water use is shown below.

	Quantity (gpm)	
Water Use[1]	Summer	Winter
• Moisture retained in heap piles	175	175
• Evaporation loss:		
- Heap piles	160	95
- Solution ponds	10	5
• Dust control	100	65
• Miscellaneous, including domestic, equipment washdown, etc.	50	50
TOTALS:	495	390
ANNUAL AVERAGE:		450 gpm

1 Estimated water use based on actual consumption figures obtained from similar operations.

3. In accordance with an approved drilling plan, 25 exploration borings and test wells have been drilled to assess the feasibility of local ground water use. The majority of these wells have been drilled in the deep alluvium of the valley floor along Hart Mine Road. This area, known as the West Well Field, is centered about 12,000 feet northwest of the project site, as shown in Figure 3.2.9, and would produce the majority of project water. About 10 wells would be required to meet project requirements. Other wells, drilled in the shallow onsite alluvium near the crushing plant, may be used, but these produce limited quantities of water. Depending upon final production rates to be determined from test pumping, other wells may be drilled. Some of these wells may be located in Section 16, Township 14 North, Range 17 East, SBB&M (see Figure 3.2.9), which is owned by the State.

4. Surface disturbances at each well site would be limited to the area necessary to establish the well and house permanent facilities. Removal of vegetation would be limited to a 12-foot wide access road, the pipeline alignment, and an approximate 100- by 100-foot area to establish the well. After wells are completed, this area would be reclaimed to an approximate 25- by 25-foot area for the permanent facilities. Pumps would be powered by electricity from the onsite generators, as shown in Figure 3.2.9. Water would be delivered from each well site to the main pipeline via a buried pipe in the well access road. The main pipeline would be an 8-inch line buried in the shoulder of Hart Mine Road extended from the West Well Field to the site. Water would be stored on the project site in a 100,000-gallon tank, located approximately as shown in Figure 3.2.9.

5. The Applicant will submit an application to BLM under Title V of the Federal Land Policy Management Act (FLPMA) for a right-of-way to transport water along the alignment of Hart Mine Road. Also, the Applicant will file a right-of-way request amendment to their prior application to the State Lands Commission for development of water wells in Section 16 and for a right-of-way along Hart Mine Road. This EIS/EIR is intended to serve as the environmental analysis required under Title V and for the State Lands Commission amendment.

3.2.5.2 Power Requirements and Supply

1. Power for the Castle Mountain Project would be needed for a variety of uses. Power requirements are estimated to peak at approximately 3,000 kilowatts and to average approximately 2,700 kilowatts, principally to operate facilities such as the primary crusher, fine crushing and conveying circuit, process plant, solution circulation pumps, and ground water well pumps. There also would be small power requirements for 24-hour lighting and

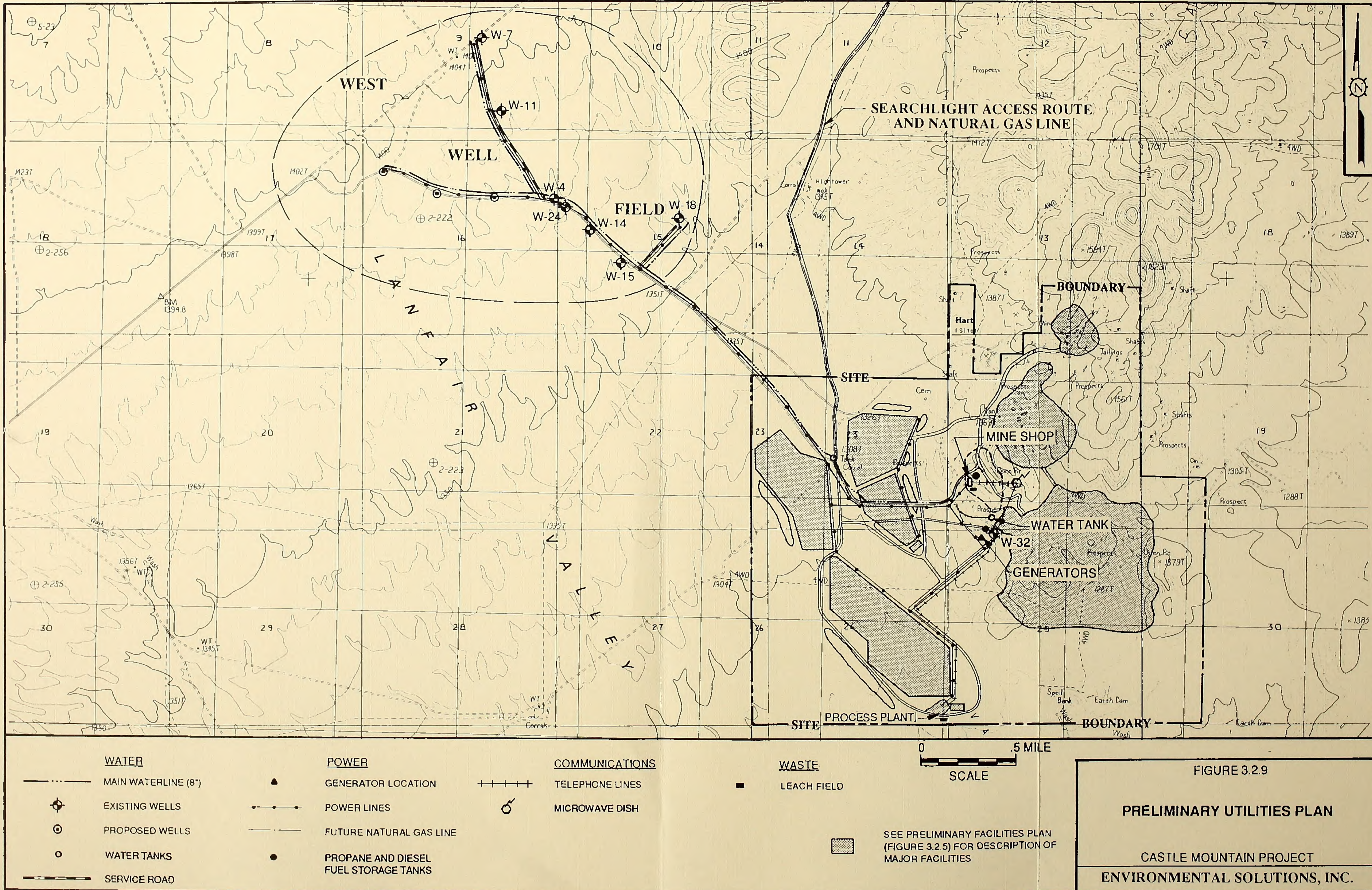

FIGURE 3.2.9

PRELIMINARY UTILITIES PLAN

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administration and maintenance facilities. Onsite generation was determined to be the most feasible method of providing power based upon evaluation of several alternatives (see Section 3.3.4, Alternative Power Supply).

2. Generators (one diesel and two or three propane) would be used to provide power and would be located near the primary crusher. Power would be distributed to onsite facilities via overhead lines on wooden poles approximately 30 feet high, which can be readily modified or relocated as required to provide flexibility to suit operations. The power lines to the West Well Field would also be on overhead poles or would be buried in Hart Mine Road, depending upon final design details and requirements of BLM. Aboveground diesel and propane fuel storage tanks would be located near the generators. Diesel tanks would be installed on prepared foundations enclosed with berms adequate to contain 1.5 times the contents of the tanks in the event of a leak or rupture, in accordance with requirements of the County of San Bernardino Department of Environmental Health Services (DEHS). The propane tank area would be fenced for security.

3. In the later stages of project operation, the Applicant plans to convert the propane-fired generator units to burn natural gas for power generation. Natural gas would be provided by extending a natural gas distribution line from the vicinity of Searchlight, Nevada to the site within the alignment of the proposed Searchlight Access Route. This would therefore limit additional surface disturbance. The Applicant would submit an application for a right-of-way for the gas line in accordance with Title V of FLPMA. This EIS/EIR is intended to serve as the environmental analysis required under Title V.

3.2.5.3 Communications

1. Telephone communication would be provided via regional microwave facilities. An onsite microwave dish would be located approximately as shown in Figure 3.2.9. An overhead line would extend from the dish to telephones at the maintenance shop and administration building.

3.2.5.4 Equipment, Structures, and Supplies

1. This section discusses the mobile equipment, main structures and supplies that would be used for operation of the mine, heap leach process, and gold recovery plant.

Equipment

1. Haul trucks, bulldozers, water trucks, and other equipment needed for the project would be primarily related to operation of the mine, heap leach facility, and onsite dust control. Based on preliminary planning data, the following types of equipment are expected to be used:

Type	Nominal Size	Estimated Quantity
Loading unit	13-cubic yard	4
Loading unit	6.5-cubic yard	1
Haul truck	85-ton	12
Blasthole drill	5.5- to 6.75-inch	4
Motor grader	G-16 Class	1
Bulldozer	D-9 Class	2
Bulldozer	D-8 Class	1
Water truck	8,000-gallon	2
ANFO explosives truck	10-ton	1
Lube and tool truck	3-ton	3
Pickup truck	3/4-ton	17
Four wheel drive passenger	Cherokee	5
Passenger van	12-passenger	7
Bus	36- to 40-passenger	2

The sizes and numbers of units actually used would depend on equipment availability, economics, and varying mining conditions. Other equipment may be added during the life of the mine in response to operational variations, such as augmenting conveyor feed to the leach pads with end-dump trucks. Under the Operating Agreement, BLM would be kept apprised of the status including the size and number of equipment units in use.

Structures

1. Two ancillary structures, a mine shop and administration/laboratory building, would be constructed for activities such as vehicle and equipment maintenance, and for administration. These buildings would be furnished with water, electricity, heat, and sewerage, in conformance with requirements of the County of San Bernardino Building and Safety Department and DEHS. Structures would be painted with colors acceptable to BLM to reduce visual contrasts.

2. The mine shop would be located in the area of the Big Chief Hill clay pit, as shown in Figure 3.2.9. It would be used for vehicle maintenance and would contain an office for mine administration and warehousing space for mobile equipment parts. It would be a pre-engineered steel structure approximately 15,000 square feet in size installed on a concrete foundation. A truck-ready line and other vehicle parking would be located nearby.

3. The administration and laboratory building would be constructed near the gold recovery plant. The structure would be about 10,000 square feet. It would be a steel frame/clad building on a concrete slab, or a series of construction trailers grouped together to provide equivalent floor space. This facility would hold offices, a laboratory, meeting rooms, lunch rooms, locker space, and warehousing. A parking area would be located adjacent to this building for use by employees, company vehicles, and visitors. Suitable access and parking would be provided for handicapped persons. An outdoor storage area several acres in size would be provided near the administration building for storage of large equipment spares and construction materials.

Supplies

1. The quantities of fuel and oil used would vary with production levels and haul distances. The approximate volumes anticipated are:

Type	Use	Estimated Quantities (gallons/month)
Motor oil	Mine equipment, vehicles	1,000
Diesel fuel	Mine equipment, vehicles, generators	260,000
Gasoline	Vehicles	10,000
Propane	Generators, process plant	250,000
Other oils	Mine equipment, vehicles, generators	2,000

Tanks for these fuels and oils would be installed on prepared foundations enclosed with berms adequate to contain the contents of the tanks in the event of a leak or rupture, as determined by the DEHS.

2. The Applicant estimates that mining and processing operations would use approximately the amounts and types of reagents shown in Table 3.2.2, Major Operating Supplies. Actual usage may vary from these estimates, depending on ore type, process distribution, weather conditions, and makeup water requirements. Where appropriate, storage facilities for reagents (e.g., sodium or calcium cyanide, hydrochloric acid) would include secondary containment for spills.

TABLE 3.2.2

MAJOR OPERATING SUPPLIES

ITEM	ESTIMATED ANNUAL AVERAGE CONSUMPTION [1] (TONS)	PACKAGING/STORING
Cement	7,000	Bulk/100-ton silo
Lime	3,000	Bulk/100-ton silo
Sodium Cyanide [2]	1,500	Briquettes or granular/bins
Calcium Cyanide [2]	3,000	Bulk/100-ton silo
Sodium Hydroxide	700	Bulk liquid/6,000-gallon tank
Hydrochloric and/or Nitric Acid	50	Drums
Activated Carbon	25	Bags, granular/reactivated carbon tank (after slurrying and draining)
Diesel Fuel	9,000	Bulk/fuel tanks
Ammonium Nitrate	4,000	Granular/prill, silo
Propane	7,000	Bulk/fuel tanks

(1) Based on processing 3.0 million tons per year. Actual volumes would vary to suit ore characteristics and operating conditions.

(2) Sodium cyanide and calcium cyanide can be substituted, one for the other, in the leaching process. Quantity of each form of cyanide reagent listed is the maximum consumption of that reagent assuming zero use of the alternate cyanide reagent.

3. Explosives would be used about five or six days per week, depending upon the mining schedule. Usually, about 215 holes would be blasted at one time. ANFO would be the major explosive used, typically an average of 150 pounds per hole. Explosives would be stored in a secured powder magazine in accordance with applicable Federal and State laws and regulations.

3.2.5.5 Onsite Roads

1. Onsite roads would connect the major facilities, approximately as shown in Figure 3.2.9. Minor changes made in order to suit final design or operational requirements would be pre-approved by BLM. These roads would be used for heavy mining equipment, ore haul trucks, and other operation and maintenance vehicles. Ore haul roads would be about 60 feet wide to permit two-way traffic of haul trucks, with safety berms and drainage ditches. Other roads would generally be about 25 feet wide for two-way traffic. Most roads would be built during the initial phases of project construction.

2. Onsite road construction would consist of grading and graveling. Dust control measures would include regular spraying with water. Frequency of spraying would depend on traffic volume, climatological conditions, and ambient wind speeds.

3.2.5.6 Storm Control Facilities

1. There are no permanently flowing streams in the vicinity of the proposed project site. One large, ephemeral streambed does pass through the western portion of the site, and run-off from the various facility areas drains toward that streambed. The proposed arrangement of the project leach pads has been established to avoid construction within the working streambed, except for haul roads. The haul roads would be provided with protected stream crossings and culverts at certain crossings.

2. Individual site facilities would be protected from storm run-off by constructing diversion ditches to direct flows into the natural streambeds. As appropriate, diversion ditches and culverts would comply with specifications acceptable to: (1) the County of San Bernardino Building and Safety Department, which would review Grading Plans, and/or (2) the RWQCB, which would review and approve storm control measures for the heap leach facilities.

3.2.5.7 Waste Containment and Disposal

1. The proposed project would generate solid and liquid wastes from construction, operation of equipment, and gold processing facilities. Wastes would be stored, recycled, or disposed of in accordance with rules and regulations set forth by the DEHS and in a manner acceptable to BLM. The following are examples of waste types anticipated:

Waste Type	Waste Generated	Disposal Procedure
Domestic waste	Paper Plastic Glass Foods/garbage	Removed to Class III landfill
Industrial waste (nonhazardous)	Tires Metal Wood Concrete	Removed to Class III landfill
Industrial waste (hazardous)	Vehicle oil Solvents Reagent containers	Recycled or removed to an appropriate hazardous waste landfill or treatment facility

The nearest Class III landfill is located in Searchlight, Nevada, about 20 miles from the site. In the later stages of project operation, the Applicant may request approval to dispose of certain materials in the project overburden pile. The types of materials disposed in this manner would include tires, scrap metal, concrete, and wood.

2. Domestic wastes would be stored in containers acceptable to BLM and designed to exclude wildlife.

3. Wastes considered hazardous would primarily be liquids, such as waste oils and fuels from vehicles, solvents, and processing chemicals, and their containers and small volumes of reagents used in laboratory testing. Used oils and other waste hydrocarbon products would be stored in tanks located in a containment area. Solvents and other chemicals would be detoxified onsite, recycled, or packaged and disposed offsite by a licensed waste disposal contractor who would haul the wastes to an approved recycler or disposal site. When possible, processing chemicals and laboratory reagents would be neutralized onsite and incorporated into the barren solution system. Chemical containers would be rinsed and either returned to the supplier for reuse or sent to an approved disposal site.

4. A spill prevention and preparedness plan would be prepared and submitted to BLM and the County. The plan would contain at least the following elements:

- Reagents

    - Types of reagents used
    - Operation, maintenance and safety procedures
    - Emergency planning
    - Local agency arrangements
    - Hazardous material incident reporting
    - Cleanup and detoxification
    - Record keeping
    - Plan implementation and amendment

- Oil Storage

    - Types of oil used
    - Spill containment facilities
    - Operation, maintenance and safety procedures
    - Emergency planning
    - Record keeping

5. Disposal of domestic wastewater from the office and maintenance shop facilities would be to septic tanks and leach fields in the vicinity of these facilities. They would be designed and located according to requirements of the DEHS. Current estimates are that total wastewater flows for the two leach fields would be about 1,500 gallons per day. Portable toilets would be used in areas, such as the mine pits, not served by the main sanitary facilities. Maintenance of portable toilet facilities would be contracted to a licensed septic pumper.

3.2.6 PROJECT TRAFFIC AND SITE ACCESS

3.2.6.1 Project Traffic

1. Daily operational traffic for the Castle Mountain Project would include vehicles for personnel such as mining, processing, and management, and for deliveries, such as fuel, reagents, and operating supplies. Vehicles and average daily trips (ADT) for the project are shown in Table 3.2.3, Estimated Weekday Traffic. For comparison, the table shows estimates for the anticipated conditions with a bus/van pool program planned by the Applicant, and for the conditions that could occur without implementation of this program.

2. Based upon preliminary estimates of employees, management staff, and deliveries, a total of about 156 daily vehicles (or 312 ADT) would be expected. Most project traffic would be related to the mining and processing employees and could total about 140 daily vehicles (or 280 ADT) at the operational peak. The planned bus/van pool program would be expected to greatly reduce this traffic so that total project traffic would be about 54 vehicles, or 108 ADT. Project traffic would, therefore, be reduced by nearly 70 percent with implementation of the bus/van pool program.

3. The estimates shown in Table 3.2.3 are for normal weekday conditions. During weekends, the traffic would be less. Deliveries of equipment and supplies would normally not be scheduled on weekends, and fewer management staff and operating personnel would be on duty. It is estimated that the weekend traffic would be about 60 ADT with the bus/van pool program.

3.2.6.2 Proposed Access

1. Improvement and use of two access routes is proposed. As shown in Figure 3.2.10, Proposed Access Routes and Improvements, site ingress/egress would be provided from the west (Ivanpah Access Route) and northeast (Searchlight Access Route). The Applicant's project planning considerations regarding site access included distance, travel time, road condition, and road maintenance requirements. Because the project is located in a relatively remote location, convenient access for employees is necessary to reduce extensive commuting distances.

TABLE 3.2.3

ESTIMATED WEEKDAY TRAFFIC

TRAFFIC SOURCE	WITHOUT BUSSING[1]		WITH BUSSING[2]	
	VEHICLES	ADT[3]	VEHICLES	ADT[3]
Employee Traffic				
Mining/Processing Staff using Individual Vehicles	140	280	28	56
Management Staff	10	20	10	20
Bus/Van Pool	--	--	10[4]	20
Equipment/Supplies Deliveries	6	12	6	12
	156	312	54	108

[1] Based upon one car per employee (i.e., no ride sharing).

[2] Based on 80 percent participation in project bus/van pool, estimated by the Applicant based on experience at similar operations.

[3] Average daily traffic (trips to and from the site).

[4] Based on vans with a seating capacity of 12.

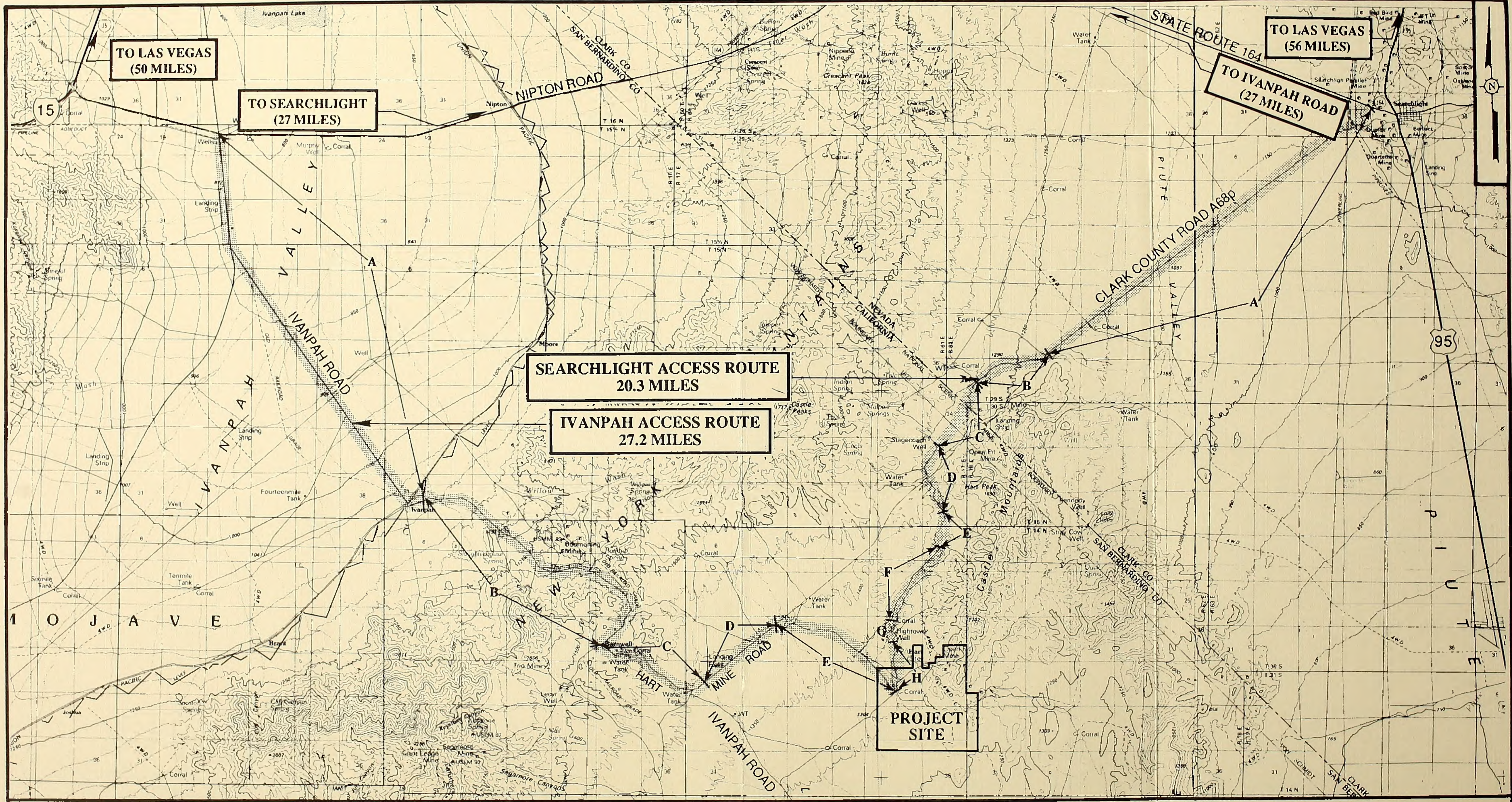
2. The Applicant believes that the majority (over 80 percent) of project employees would live in communities such as Bullhead City/Laughlin, Searchlight, Boulder City/Henderson, and southern Las Vegas. The most direct access from these communities from the east would be via U.S. Highway 95 to Searchlight and then about 20 miles along the Searchlight Access Route to the project site. The Ivanpah Access Route would, provide for deliveries of equipment and supplies and a limited number of employees from the west. Both routes are therefore desired by the Applicant for convenience of employees and efficiency of project operation.

3. The Applicant would be required to submit a right-of-way application to BLM for improvement and use of access roads on Federal land, pursuant to Title V of FLPMA (see Appendix B). Also, the State Lands Commission requires a right-of-way application for those portions of service roads and the Hart Mine Road on Section 16, T.14N, R.17E, SBB&M. This EIS/EIR is intended to serve as the environmental analysis required for those right-of-way applications.

4. As shown in Table 3.2.4, Proposed Access Improvements, both routes would use existing County-maintained roads and established dirt roads for access into Lanfair Valley. Realignment of some segments, particularly along the Searchlight Access Route, would involve new construction. Upgrading of dirt roads with grading and graveling would be required for safety purposes. Road signs would be posted to indicate road conditions, turnouts, and speed limits. Generally, maintenance would be the responsibility of the Applicant. Existing conditions and required improvements along these two access routes are described in the following.

Ivanpah Access Route

1. The 27.2-mile long Ivanpah Access Route would follow paved and upgraded dirt roads from the intersection of Ivanpah Road with Nipton Road (about three miles east of Interstate 15) southwesterly to the site. This route would provide access to the metropolitan areas of southern California and the Las Vegas Valley in Nevada. It is anticipated that it would be used for the initial delivery of heavy equipment for construction, and for deliveries of fuels and supplies during project operations. Visitors from metropolitan areas and some employees would probably also use this access.



LEGEND

ACCESS ROUTE

F ROAD SEGMENT (SEE TABLE 3.2.4 FOR CORRESPONDING DESCRIPTION)

0 2.5 5 MILES
SCALE

CONTOUR INTERVAL: 50 METERS

REFERENCE: 30- x 60-MINUTE U.S.G.S. TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA-NEVADA, AND DAVIS DAM, ARIZONA-NEVADA DATED 1985 AND 1982, RESPECTIVELY

FIGURE 3.2.10

PROPOSED ACCESS ROUTES AND IMPROVEMENTS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 2/28/89

TABLE 3.2.4

PROPOSED ACCESS IMPROVEMENTS

(See Figure 3.2.10 for Corresponding Road Segment Locations)

IVANPAH ACCESS ROUTE

Road Segment	Length (miles)	Status	Approximate Width	Proposed Improvement	Maintenance Responsibility [2]	Reclamation
A. Ivanpah Road	10.9	Paved	2 lanes	None	San Bernardino County	No
B. Ivanpah Road	7.4	Graded dirt	24 feet	None	San Bernardino County	No
C. Ivanpah Road	2.9	Graded dirt	14 to 16 feet	Add 5 Turnouts[1]	Applicant	No
D. Hart Mine Road	2.4	Graded dirt	14 to 16 feet	Add 4 Turnouts	Applicant	No
E. Hart Mine Road	3.6	Graded dirt	16 to 18 feet	Add 6 Turnouts	Applicant	No

SUMMARY:

Access Route Length	27.2 miles
New Road Construction	0.0 miles
Improvements to Existing Road	6.5 miles

SEARCHLIGHT ACCESS ROUTE

Road Segment	Length (miles)	Status	Approximate Width	Proposed Improvement	Maintenance Responsibility [2]	Reclamation
A. Clark County Road A68P	9.5	Graded dirt	14 to 16 feet	Add about 20 Turnouts[1]	Clark County/Applicant	No
B. Unnamed Trail	1.9	Unimproved trail	10 to 12 feet	Grade and widen[3]	Applicant	Yes
C. None	1.9	Vacant	--	New road construction[3]	Applicant	Yes
D. Unnamed Trail	1.8	Unimproved trail	10 to 12 feet	Grade and widen[3]	Applicant	Yes
E. None	0.9	Vacant	--	New road construction[3]	Applicant	Yes
F. Unnamed Trail	2.3	Unimproved trail	10 to 12 feet	Grade and widen[3]	Applicant	Yes
G. None	0.5	Vacant	--	New road construction[3]	Applicant	Yes
H. Unnamed Trail	1.5	Unimproved trail	10 to 12 feet	Grade and widen[3]	Applicant	Yes

SUMMARY:

Access Route Length	20.3 miles
New Road Construction	3.3 miles
Improvements to Existing Road	7.5 miles

(1) Turnouts (each approximately 300 feet in length) to be constructed every 0.5± miles.
(2) Maintenance by Applicant includes signage, grading, graveling, and dust control.
(3) Road widening would be limited to about 16 feet, except where safety considerations would dictate a wider road (about 25 feet), such as around curves.

2. The 10.9 miles of the Ivanpah Access Route from Nipton Road to slightly past Ivanpah are paved and maintained by the County of San Bernardino. The County also maintains the next approximately 7.4 miles of dirt road passing through the New York Mountains to Barnwell (see Figure 3.2.10). The Applicant would not improve or maintain these road segments.

3. For the remaining approximate 8.9 miles from Barnwell to the project site, the existing alignment of the Hart Mine Road would be used. The Hart Mine Road is graded at infrequent intervals by the Applicant and other claim holders in the area. The graded dirt portion of this access traverses Joshua tree woodland/creosote bush scrub on the floor of northern Lanfair Valley. As shown in Table 3.2.4, the Applicant would construct turnouts at about 1/2-mile intervals along this length of Hart Mine Road. Each would consist of widening the road from its existing approximate 16-foot width to about 25 feet, for a length of about 300 feet. Widening along Segment C (see Figure 3.2.10) of Hart Mine Road would be restricted to the south side of the road, as the north side of the existing road abuts Wilderness Study Area (WSA) 266. Construction activities would not encroach within the WSA. Segment D is a straight, nearly level section of the abandoned Barnwell and Searchlight railroad grade that has been built up as much as 15 to 20 feet above the existing topography. It also forms part of the southern boundary of WSA 266, so turnouts would only be constructed on the south side of the roadway.

Searchlight Access Route

1. The 20.3-mile Searchlight Access Route follows 10.8 miles of unimproved trails and 9.5 miles of a graded dirt road (maintained by Clark County), from the project site to Searchlight, Nevada at U.S. Highway 95. U.S. Highway 95 passes through Searchlight, providing northerly access to south Las Vegas valley communities and southerly access to Laughlin, Bullhead City, and Needles. Because of the variety of lifestyles and housing in these communities within reasonable commuting distances from the project site, it is expected that most mining and processing employees and management personnel would use this access route to the project site.

2. From the project site, the Searchlight Access Route would follow the unimproved dirt roads to the north, traversing the Joshua tree woodland/creosote bush scrub on the floor of northern Lanfair Valley, then pass through gently rolling terrain between the New York and Castle Mountains to Piute Valley where it links with Clark County Road A68P (see Figure 3.2.10). Because there is little relief in the topography, realignment of existing trails or new road

construction through this area would not involve large cuts or fills. This 10.8-mile portion of the route would require 7.5 miles of improvements to existing roads (Segments B, D, F, and H), and about 3.3 miles of new road construction (Segments C, E, and G).

3. Near the State Line, the route would link with an existing 9.5-mile graded dirt road that extends across the floor of Piute Valley to Searchlight. This road was constructed on the grade of the abandoned Barnwell and Searchlight Railroad and is maintained by Clark County, Nevada. As shown in Table 3.2.4, this portion of the route would not generally be improved, but it is proposed that turnouts be constructed about every 0.5 mile for safety purposes (Segment A of this route in Figure 3.2.10). Some restoration would be required at locations where the original railroad embankment was constructed across washes, as it has since been destroyed by flood waters. At these locations, the road would be restored to its original alignment, by cutting down the embankment on both sides of the washed out grade to provide a gradual slope at both sides of the washout. The reconstructed road through the washes would be widened to about 25 feet. Culverts and/or rock protection may be provided at some locations. The present detours would be reclaimed. Prior to any earthmoving, areas to be disturbed would be examined for desert tortoises, and any tortoises found would be relocated using procedures acceptable to BLM.

5. As discussed in Section 3.2.5.2, Power Requirements and Supply, this route would also serve as the alignment for a future natural gas pipeline to serve the project.

3.2.6.3 <u>Trip Distribution</u>

1. Based upon the considerations discussed above, it is expected that deliveries of equipment and supplies would be via the Ivanpah Access Route, while the majority of employees would use the proposed Searchlight Access Route. Employees living in communities along U.S. Highway 95 would not be expected to use the Ivanpah Route, since it would require an additional 34 miles of driving compared to the more direct Searchlight Access Route.

2. Based on the daily traffic estimates provided in Table 3.2.3, the following trip distribution is expected:

Traffic Source	Ivanpah Access Route Vehicles (ADT)	Searchlight Access Route Vehicles (ADT)
Mining/Processing staff	6 (12)	22 (44)
Management staff	4 (8)	6 (12)
Equipment/Supplies deliveries	6 (12)	0 (0)
Bus/Van pool	0 (0)	10 (20)
TOTALS	16 (32)	38 (76)

This distribution assumes that 80 percent of project employees would live in communities along U.S. Highway 95. Based on this assumption, about 30 percent of project traffic would use the Ivanpah Access Route, and about 70 percent would use the Searchlight Access Route. This would mean that for the life of the mine, traffic on the Searchlight Access Route would be similar to that on Lanfair Road.

3.2.7 OPERATIONAL CONSIDERATIONS

3.2.7.1 Operating Agreement

1. Project components have been described as accurately as possible based upon the best data available, including preliminary engineering studies and anticipated requirements of air and water quality permits. It is typical of mining projects that final design modifications and operational changes occur as the final permits and engineering are completed, and in response to additional exploration data, actual ore properties, operating experience, evolving mining technology, and economic conditions. The environmental analyses presented in this document have recognized the need for some flexibility in project layout and operation by studying the entire 2,735-acre project site, the West Well Field, and the Searchlight Access Route. The actual area of anticipated disturbance would be substantially less. At the same time, however, it is not intended that large modifications to the project be made without appropriate evaluation of related impacts and their relationship to the analyses included in this report.

2. Appropriate agency control and required project flexibility would be facilitated by an Operating Agreement that would be entered into by BLM and the Applicant prior to actual field construction. The agreement would establish a formal procedure by which minor modifications could be made to the project layout or operations as described in the Plan of Operations and evaluated in this EIS/EIR. Major project modifications would still require an amendment to the Plan of Operations pursuant to 43 CFR 3809 regulations. This Agreement would not affect the County's responsibilities for implementing the California Surface Mining and Reclamation Act (SMARA) and for approval of the proposed site plan in accordance with the County Development Code.

3.2.7.2 Construction and Operations Personnel

Construction

1. Short-term personnel requirements for project construction activities are expected to range from a low of about 100 to an estimated high of 200. Construction is expected to begin immediately following project approval and last for about six months. The activities and construction personnel are anticipated to peak at about the fourth month, then decline over a period of about two months until construction is complete.

2. Contractors hired for constructing the facilities could be from the larger communities in San Bernardino County or other western states that serve the mining industry. It is expected that those contractors who are not local would provide a certain number of management personnel who would reside temporarily in the Las Vegas area. In addition, they would hire temporary local help. This temporary help could be from communities in California or southern Nevada.

Operation

1. Long-term personnel requirements for project operations are expected to range from an initial work force of about 10 to 20 to a normal operating level of about 150 for the life of the project. Approximately 150 (140 processing/mining and 10 management) employees would be onsite during any given weekday period. About 100 employees would be onsite for weekend activities. The permanent work force would be recruited as the facilities are built so that the operator would be able to rapidly attain full capacity at completion of construction.

2. The majority of project employees are expected to be from the metropolitan areas south of Las Vegas and southern Clark County communities, such as Boulder City, Laughlin, or Searchlight. A limited number of employees may also reside in small California communities, such as Baker.

3.2.7.3 Security, Health, and Safety

1. Project operations would be conducted in accordance with MSHA requirements and guidelines. Security and safety measures would be implemented to protect mining and operations personnel and the general public. These measures would incorporate physical barriers, such as fencing and berms, with appropriate signage, and the implementation of safety training procedures. Two 8,000-gallon water trucks would be available for use in the event of fire.

Fencing, Barriers, and Signs

1. Fencing would be used to control access and to preclude access to potentially hazardous areas. Most facilities would be surrounded with barbed wire fencing that would be built to BLM

specifications and would restrict access to designated points. Chain link fencing would be used to preclude access by unauthorized persons to potentially hazardous areas. Fenced areas would include the following:

Primary Facilities	Fencing
Mine pits	Barbed wire at potential access points
Overburden pile	Barbed wire, surrounding
Crushing facility	Barbed wire, surrounding
Heap leach pads	Barbed wire, surrounding
Solution ponds	Chain link, surrounding
Gold recovery plant	Chain link with razor wire at top, surrounding
Ancillary Facilities	
Explosives magazine	Chain link with razor wire at top, surrounding
Generators	Chain link with razor wire at top, surrounding

2. Other physical barriers such as earthen berms would be employed to restrict vehicle access at certain areas, including the mine pits, the crest of the overburden pile, and along haul roads.

3. Warning signs would be posted at regular intervals on perimeter fencing around the various facilities and at potential access points. Road signs and maximum speed limits would be posted along access routes.

Security and Safety Procedures

1. Project security would be provided by trained security personnel with controls at entry gates and vehicles to monitor the entire site. Security personnel would be on duty on a 24-hour basis.

2. Safety for the general public would be provided by the physical barriers and by project security. Visitors to the Castle Mountain Project would be limited to specific areas and guided by project personnel. Large mobile mining equipment such as haul trucks and loaders would not use roads accessible to the general public unless preceded by a pilot car. Public traffic would be excluded from the haul roads. An operations viewing area and interpretive/information site would be provided at an appropriate location acceptable to BLM.

3. Procedures established by MSHA would be strictly followed to protect the health and safety of the general public and project employees. In accordance with these guidelines, employees

would receive regular first aid and safety training for their specific tasks, such as operating equipment. Personnel in the processing area would receive training in the handling of reagents and would be familiar with a plan for containment and cleanup of potential spills. A vehicle would be available onsite to transport personnel to a hospital in the event of an injury.

3.2.7.4 Wildlife and Livestock Protection

1. The project design has incorporated several measures for the protection of wildlife and livestock during project operation. These include both physical barriers and operational training and procedures.

2. Measures have been incorporated in the facilities design to reduce the attraction of wildlife and to discourage entry into hazardous areas. These features would include:

   - Shielded lighting to reduce the potential for attraction to nighttime operations.
   - Fencing around solution ponds to exclude animals.
   - Netting over solution pond surfaces to exclude birds and bats.
   - Drip irrigation on top of heap leach piles to reduce potential for solution ponding.
   - Closed pipes to convey cyanide solution.
   - Guzzler relocation for a wildlife guzzler near the project site and another near an access road.

3. Additional procedures implemented as part of project operations would benefit wildlife. These would include:

   - Project waste would be properly managed and the site monitored to control human garbage that could attract wildlife, especially ravens.
   - A program of bus/van pooling would be implemented to reduce project traffic. This would reduce potential impacts to wildlife, especially the desert tortoise, along roads.
   - A wildlife education program for construction workers and employees would be implemented to acquaint personnel with laws protecting vegetation and wildlife and procedures to be followed should wildlife be encountered. This program would be coordinated with safety training sessions, which are required at regular intervals by MSHA.
   - The Applicant would employ an environmental specialist or contracted consultant to monitor the effectiveness of wildlife mitigation measures and the revegetation program. Results would be submitted to BLM on a regular basis.

4. Measures to protect livestock would include barbed wire fencing around project facilities and cattleguards at locations where fences cross access roads. In addition, BLM grazing lessees would be compensated by the Applicant for livestock killed or injured by vehicles driven by project employees.

3.2.7.5 Exploratory Drilling

1. The Castle Mountain disseminated orebodies were located and their configurations defined by a program of exploratory drilling completed by the Applicant. This program was initiated following approval of a Plan of Operations in accordance with 43 CFR 3809 regulations. Orebody definition drilling will likely continue on the project site through the operational period. Mine pit design may be varied in response to this program.

2. Other exploratory drilling by the Applicant or other parties in areas adjacent to or surrounding the Castle Mountain Project site would require application to, and approval by, BLM or other appropriate regulatory agencies such as the State Lands Commission. The Applicant submitted an application to the State Lands Commission in July, 1987, for exploratory drilling of eight holes in Section 36, T. 14N., R. 17E., SBBM, but this application has since been withdrawn. The potential for other exploratory drilling in the vicinity is described and evaluated in Chapter 8.0, Cumulative Impacts.

3.2.8 RECLAMATION

3.2.8.1 Introduction

1. Reclamation of areas affected by the Castle Mountain Project would be administered by the County of San Bernardino, in accordance with SMARA, and by BLM, in accordance with 43 CFR 3809 regulations. SMARA (Section 2733) defines reclamation as the combination of land treatments that minimize water degradation, air pollution, damage to aquatic or wildlife habitat, and erosion. The Code of Federal Regulations (43 CFR Section 3809.0-5) defines reclamation as taking reasonable measures to prevent unnecessary or undue degradation of Federal lands, including reshaping land and, where necessary, revegetating. The Applicant would be required to employ measures to meet these objectives.

2. According to the County Development Code, implementation of reclamation is intended to provide for the production and conservation of minerals, while giving consideration to values

relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment, and to provide for public health and safety (Section 812.0101). Principal use of Federal lands, as defined by Section 103 of FLPMA, "is limited to domestic livestock grazing, fish and wildlife development and utilization, mineral exploration and production, rights-of-way, outdoor recreation, and timber production." The Castle Mountain Project would comply with these objectives by providing for a continuation of existing uses including mining, livestock, grazing, wildlife habitat, and recreation.

3.2.8.2 Reclamation Plan

1. Code of Federal Regulations policy encourages the development of Federal mineral resources and reclamation of disturbed lands consistent with FLPMA and the Mining and Mineral Policy Act of 1970. Under the mining laws, a person has a statutory right, consistent with Department of Interior regulations, to go upon open Federal lands for the purpose of mineral prospecting, exploration, development, extraction, and other uses reasonably incident thereto. However, "this statutory right carriers with it the responsibility to assure that operations include adequate and responsible measures to prevent unnecessary or undue degradation of the Federal lands and to provide for reasonable reclamation" (CFR 3809.0-6).

2. SMARA states that "Surface mining takes place in diverse areas where the geologic, topographic, climatic, biological, and social conditions are significantly different and that reclamation operations and the specifications therefore may vary accordingly." (Article 1, Section 2711[c]). In recognition of this, reclamation procedures for the Castle Mountain Project would include definition of feasible goals and objectives based upon assessment of existing conditions, especially the semi-arid climate and generally poor soil conditions. The goals and objectives would be refined through experience gained from an onsite revegetation research program sponsored by the Applicant.

3. The Castle Mountain Project would employ reclamation procedures as an active part of ongoing operations, in addition to specific activities when the project is completed. For example, as activities over portions of the project site are completed, reclamation procedures would be initiated in a four-phase program. The reclamation procedures would be implemented by the Applicant to the satisfaction of BLM and the County. For some measures, consultation with the appropriate agency may be required before and/or during onsite reclamation activities. Results of reclamation and revegetation success rates would be reported to BLM and the County on a regular basis.

Reclamation Procedures

1. The 43 CFR 3809 regulations define standards for reclamation of mining activities on Federal lands. These standards include procedures such as: (1) saving soil for final application after reshaping of disturbed areas has been completed, (2) measures to control erosion, landslides, and water run-off, (3) measures to isolate, remove, or control toxic materials, and (4) reshaping of the area disturbed, application of soil, and revegetation of disturbed areas, where reasonably practicable. Reclamation efforts shall be implemented at the earliest feasible time, except to the extent necessary to preserve evidence of mineralization.

Revegetation

1. SMARA states that the reclamation process may require backfilling, grading, resoiling, revegetation, soil compaction, and stabilization (SMARA, Section 2733). Revegetation is an important part of reclamation plans because it can provide erosion and sediment control, dust control, slope stability, wildlife habitat, and visual resource enhancement.

2. The Applicant would develop a revegetation program acceptable to the County and BLM based upon specific information on existing vegetation and from research and data to be collected onsite. The Applicant would solicit qualifications statements from academic institutions and private firms and select a consulting expert qualified in desert flora acceptable to BLM. This research program would include at least the following elements:

    - Review available materials describing methods and success rates of revegetation programs employed on other lands in the arid west to determine the best available procedures.
    - Development of the methodology for research and a schedule for implementation of the revegetation program for submittal to BLM and the County within the first year of project operation.
    - Establishment of goals for vegetation recovery, including vegetation cover, species composition on different landforms, and time frames for achievement. The goals would be periodically reevaluated and adjusted as necessary during implementation, the objective being to work towards reestablishment of pre-disturbance cover.
    - Stockpiling of available soil. Redistribution of soils over disturbed areas would be completed following completion of activities on an area. Studies would be completed to determine where available soil would be most effectively used.

- Identification of dominant species common to Lanfair Valley to be used in revegetation including *Larrea tridentata*, *Ambrosia dumosa*, *Hymenoclea salsola*, and grass species such as *Hilaria jamesii* and *Oryzopsis hymenoides*. Salvaging of individuals of species amenable to transplantation, such as small Joshua trees and barrel cactus, to be kept in nursery areas and replanted on reclaimed areas to provide a continuous seed source. A goal would be to transplant at least 25 percent of barrel cactus and 25 percent of all Joshua trees under four feet tall.
- Selection of a site appropriate for a nursery. Considerations would include water availability, access, and other requirements determined by the revegetation experts. A preliminary site could be within the soil storage area located adjacent to the southwest leach pad (see Figure 3.2.5). Other areas to be disturbed for soil storage could also be used as nursery sites depending upon the total acreage required.
- Development of a geographic plan to coordinate and phase revegetation efforts in accordance with mining and processing operations. A goal would be to initiate revegetation procedures within six months following completion of project activities over an area.
- Monitoring for potential invasion of exotic species. If exotic species densities exceed those of nearby previously disturbed areas, a program of weed control acceptable to the County and BLM would be implemented.
- Employment of reseeding, transplantation, fertilizing, and watering procedures determined appropriate for each disturbed area in the program methodology.
- Evaluate the benefits of removing, shredding, and composting vegetation that would otherwise be lost.
- Ground preparation procedures would include ripping and harrowing of compacted soils. Criteria for slope gradients would be determined through onsite research on revegetation success.
- Development of a long-term monitoring program following project completion to verify revegetation results based upon the goals for species composition and cover and to determine what additional measures (including watering and reseeding) would be necessary.

The revegetation program would be implemented by the Applicant using onsite equipment. The program would be directed by a qualified consultant or environmental specialist employed by the Applicant. The methodology used, goals developed, and modifications required for this program would be subject to approval by BLM. Results would be reported to BLM and the County on a regular basis.

<u>Wildlife Habitat</u>

1. The reestablishment of wildlife habitat on disturbed areas would take place primarily as revegetation occurs. In addition, other measures related to use of the area by wildlife would include the following:

- Raptor ledges would be constructed on pit walls at appropriate locations determined by a BLM wildlife biologist.
- Harvesting of some plants that would not be transplanted. These would be distributed over reclaimed areas to be used as microenvironments for small animals.
- Mine shafts and adits from former workings would be left open or would be closed in a manner that would provide for public safety but also for ingress/egress of bats and other wildlife species that would use these as habitat.

Visual Resources

1. The proposed project is located in the East Mojave National Scenic Area (EMNSA). Within this area, the EMNSA Plan (1988) requires that nondiscretionary projects such as mining operations "be designed to be as visually unobtrusive as best practices allow." In compliance with this objective, the Castle Mountain Project would incorporate design features such as BLM-approved coloration of structures and special contouring of large scale features (such as overburden pile and heaps). In addition, specifically designed methods for site revegetation would be employed and rock staining solutions would be applied to reduce color contrasts of the upper mine pit walls. The potential visual effects of the project and the effectiveness of these measures are evaluated in Section 5.8, Visual Resources, of this document.

Drainage/Erosion Control

1. The layout of project facilities is such that major drainage channels would not be altered. The open pits would collect minor flows, but the drainage area into those facilities is limited. Cuts and fills would be designed to avoid excessive erosion. Grading plans would be subject to review and approval by the County of San Bernardino Land Management Department. Reclamation procedures would employ contouring of surfaces for proper drainage and to limit erosion. The revegetation program would enhance erosion control.

Public Safety

1. Public safety during the operational period would be provided in accordance with MSHA procedures. Public safety would be maintained following project completion by final reclamation requirements that would include slope stabilization where required, removal of buildings, structures and equipment, and use of barriers such as berms to prohibit vehicle access into mine pits.

Implementation

1. Implementation of the reclamation plan would involve four overlapping phases that would begin prior to project construction and continue following project completion. These phases and their general activities are summarized in the following:

- Phase I - Preconstruction - This phase would involve a program of data collection for existing conditions. Baseline data would be gathered by the Applicant's environmental specialist or consultant from detailed field inventories of environmental factors, such as soils, vegetation composition and cover, wildlife density and diversity, grazing forage, and hydrologic conditions. Native seed sources and nursery sites would be identified. These data would be used to formulate feasible reclamation goals and to compare and evaluate the effectiveness of the reclamation process.
- Phase II - Construction - This phase would involve removal of vegetation and soils as areas are scheduled for initial project activities. Plant specimens and seeds would be collected for the revegetation research program. Individuals of plant species amenable to transplantation would be collected for nursery stock. Other species that repeatedly fail transplant attempts would be harvested for use as animal microenvironments or compost. Soils identified in Phase I as valuable for reclamation would be removed and stockpiled in the soil storage areas identified in Figure 3.2.5.
- Phase III - Operation - Reclamation efforts would be initiated in disturbed areas as activities are discontinued. For example, sections of the overburden pile may be brought to final grade in 40- to 50-acre tracts and revegetation efforts initiated. Heap piles would be reclaimed once it has been determined that the economically recoverable gold had been extracted from the ore. Ground surfaces would be prepared by recontouring, scarifying, and replacing soils. Vegetation transplanting and reseeding would begin using procedures developed by the revegetation research program.
- Phase IV - Final Reclamation - This phase would begin at the cessation of mining operations. Actions completed would emphasize measures to protect public health and safety and to complete revegetation. Onsite buildings would be dismantled and removed. Treatment of major facilities would include:
    - Mine Pits - These would essentially be left intact for potential future mining use should low grade ore in pit walls become economically desirable. No revegetation efforts would be completed for these mineralized areas and because the rock walls would be generally unsuitable for plant establishment. However, if an abandoned pit has no significant mineralization in its walls, that pit may be partially backfilled with overburden from an active pit. The upper walls of the mine pits would be stained to reduce color contrasts.
    - Overburden Pile - The crest and southern face of the pile would be contoured for visual purposes. The top surface would be layer dumped to provide a loose substrate that would be more conducive to

plant establishment and would be graded as necessary for proper drainage and to avoid erosion. Available soil would be replaced. Revegetation efforts would be completed in accordance with the Revegetation Program.

- Heap Leach Piles and Solution Ponds - Heap piles would be neutralized and decommissioned by circulating rinse water in accordance with RWQCB procedures. The surface would be graded and spread to bury liners and ditches. Soils would be replaced to the extent possible, surface areas would be scarified, and revegetation efforts would be completed. Solution ponds would be neutralized and evaporated in accordance with RWQCB requirements. Pond liners would be perforated and buried at least five feet deep. The surface would be graded and revegetation efforts completed in accordance with the Revegetation Program.

- Buildings, Structures, and Roads - Buildings, structures, and fencing not needed for continued reclamation and monitoring would be dismantled and removed from the site. Concrete footings, slabs, and foundations would be buried at least five feet deep, either in place or in the overburden pile. Building sites, site roads, parking lots, and appropriate portions of access roads would be reworked, scarified, and revegetated in accordance with the Revegetation Program. Aboveground utilities would be removed. Underground lines would be capped and covered. All other equipment and materials would be removed from the site. Water facilities would become the property of BLM.

3.2.8.3 Bonding

1. The 43 CFR 3809 regulations permit bonding of operations at the discretion of the authorizing officer. BLM policy requires bonding for cyanide heap leach operations on public land. The purpose of a bond for the Castle Mountain Project would be to guarantee completion of project reclamation to the satisfaction of BLM and the County.

2. The bond amount would be determined by BLM and the County based upon the final design plans for the acreage to be disturbed and the projected costs of reclamation. Acreage disturbed calculations would include at least the following project elements:

   - Onsite roads, including haul roads and vehicle access
   - Heap pads
   - Solution ponds
   - Overburden pile
   - Soil storage areas
   - Support facilities including process plant, crushing area, and mine shop
   - Searchlight Access Route

Reclamation costs for these areas and facilities would be appraised at the prevailing cost rates at the time reclamation is to be completed. Cost rates would be based upon completion of at least the following activities:

- Removal of equipment and materials
- Surface contouring
- Rock staining
- Soil redistribution
- Ground preparation/scarifying
- Reseeding[1]
- Vegetation transplanting
- Watering and fertilizing[1]

3. The bond would be jointly assessed by BLM and the County and the Applicant would be required to deliver a surety bond or one or more irrevocable letters of credit payable to the benefit of the United States and San Bernardino County. The bond would be maintained in an amount at least equal to the estimated total cost of reclamation for the acreage being disturbed. The BLM and County would regularly reexamine the adequacy of the allocated amount for reclamation work based upon the extent of operations and costs in effect at the time of reassessment.

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1 Reseeding, watering and fertilizing would be completed as determined feasible. The feasibility would be determined through the success of onsite revegetation studies completed during the life of the operation.

3.3 ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

1. Several alternatives to various aspects of the proposed action were considered during the preliminary project design phase and preparation of this document. The purpose of reviewing alternatives in this section is to determine if other methods of operation or location of facilities is economically and technologically feasible and if so, if they would be capable of eliminating significant adverse effects of the proposed action or reducing them to a level of insignificance. This section describes alternatives to the proposed action and the reasons they were determined not to be feasible or were not capable of reducing or eliminating an impact of the proposed action. These alternatives include:

   - Alternative Mining and Processing Technologies
   - Alternative Locations for Project Facilities
   - Alternative Water Supply
   - Alternative Power Supply

   For each potential alternative, the method planned for the proposed Castle Mountain Project is first stated. These methods and facilities locations were described in detail for the proposed action in Section 3.2, Proposed Action.

2. Based upon the consideration of alternatives to the proposed action, an alternate location for site access was found to be feasible. That alternative is described in Section 3.4, Alternatives to be Further Analyzed.

3.3.1 ALTERNATIVE MINING AND PROCESSING TECHNOLOGIES

3.3.1.1 Alternative Mining Techniques

1. Alternate methods to mine ore would include strip mining and underground mining. These methods, as described below, were determined inappropriate because they are employed for orebodies that are different in nature from those at the Castle Mountain site.

Proposed Open Pit Procedure

1. Characteristics of the Castle Mountain orebodies were evaluated to determine the optimal mining technique for the proposed action. The deposits occur in consolidated rock, disseminated at an ore grade of about 0.05 to 0.06 ounces of gold per ton of rock. The orebodies underlie variable depths of overburden, some being 250 feet thick. This material

must be excavated in an open pit that is concentrically smaller at the bottom. Overburden material must first be removed before the ore deposits can be mined.

2. Due to the disseminated nature of the deposits and the configuration of the orebodies, the proposed open pit mining method is considered the only viable method of mining the Castle Mountain deposits.

Strip Mining

1. Strip mining is a linear method of removal that is typically applied to shallow deposits of minerals such as coal, potash, or uranium which occur in horizontal seams. Such deposits are usually flat-lying sedimentary formations that extend over a substantial area. Strip mining is practical for such deposits because their recovery generally requires shallow excavation over a relatively large and contiguous area. In strip mining, only a portion of the overburden and ore are initially mined. Then, as mining advances into an adjacent portion of the ore and overburden, the overburden excavated during the advance is permanently disposed of by placing it in the excavated area created during the earlier stage of mining. In this manner, the mining process acts as a moving trench that is filled in behind.

2. This method is physically impossible for deposits such as those at Castle Mountain, which have a relatively limited areal extent. Because of the configuration and depth of the project orebodies, there is insufficient space within the pit to dispose of overburden from a portion of the pit being actively worked into an area where mining has been completed. Instead, overburden must be removed from the pit in order to expose the orebodies.

Underground Mining

1. Underground mining is typically suited to deep mineral deposits of high-grade veins or seams that can be mined. Such deposits generally require removal of a relatively small volume of the host material in order to recover the mineral values. In the case of high-grade veins, values are typically confined to discrete structural discontinuities such as joints or fractures in a competent host rock. Underground tunnels can be excavated along these deposits, leaving most of the host rock in place to support the overburden. This method of mining is not applicable to disseminated low-grade orebodies such as those at the Castle Mountain Project site.

3.3.1.2 Alternative Overburden and Processed Ore Disposal

1. Due to the volume of material, the only potential alternative to overburden and processed ore disposal would be complete backfilling into the mine pits since offsite hauling to another location would be economically infeasible and would not reduce or eliminate the environmental impact of overburden and ore disposal. Considerations that discourage employment of complete pit backfilling are addressed in this section.

Proposed Procedures

1. An estimated 60 million tons of overburden and 30 million tons of ore would be removed from the mine pits. Overburden would be deposited in the overburden pile. Ore that would be crushed and leached would remain at the heap leach piles. The planned distribution of overburden and heap piles is shown in Figure 3.2.5, Preliminary Site Plan.

Complete Pit Backfilling

1. As an alternative to permanent surface disposal of overburden and ore, complete backfilling could potentially reduce the project's visual effects. Open pit mines, such as those proposed for the Castle Mountain Project, are not suitable for backfilling, from both operational and economic standpoints. During project operations, the piles would still be constructed (as they are with permanent surface disposal) and then replaced in the pit at the completion of mining. Overburden would therefore be present for the duration of the project. If backfilling were used, the procedure would not totally remove the overburden pile because the rock volume is about 30 percent greater in its broken and unconsolidated form after mining. Complete backfilling would not, therefore, eliminate the impact of ore and overburden disposal. The cost of complete pit backfilling all of the material removed could render a commercial open pit mining operation economically infeasible.

2. Complete backfilling of a mined area is primarily used at strip mines where the mineral exists in relatively well-defined layers. Overburden can be removed from one area and deposited in an adjacent area, thereby minimizing costly double handling. The relationship between ore and overburden in such mines generally favors placing overburden material into the shallow cuts of areas previously mined.

3. An additional consideration in evaluating the relative merits of backfilling is the conservation of mineral resources and energy. Complete pit backfilling could be in conflict with objectives

of Federal and State mining statutes, if additional minerals could be extracted from the pit walls. The California Surface Mining and Reclamation Act states that "... the reclamation of mined lands ... will permit the continued mining of minerals and will provide for the protection and subsequent beneficial use of the mined and reclaimed land" (Section 2711[b]). The protection of remaining mineralization at a reclaimed mine site is incorporated into Federal regulations, such that "Reclamation may not be required where the retention of a stable highwall or other mine workings is needed to preserve evidence of mineralization" (43 CFR 3809.05[j]).

4. Gold mineralization is disseminated at the Castle Mountain site, with no sharp physical demarcation between ore and overburden. In such circumstances, the material is mined to an economic "cut-off" grade. Mineralization in the walls and floor of the pit will contain gold in concentrations which are uneconomic to mine at the current gold price. However, future improvements in technology (or lower unit costs that might be achieved with improved technology) and/or a higher gold price would allow the operator to mine these areas and increase the ultimate recovery of the resource. Backfilling could preclude future recovery of this mineralization in the mine pits.

5. Based upon these considerations, it is expected that the potential loss of mineral resources and economic disadvantages of complete pit backfilling for this project would be greater than the potential environmental advantage of a reduced visual impact. Replacement of the overburden in the mined-out pits would extend the life of the project to require several years of economically unproductive activity, with related impacts of energy use, water use, air quality impacts that would not otherwise occur.

3.3.1.3 Alternate Gold Extraction Techniques

1. Alternative gold extraction methods could include flotation, carbon-in-pulp leaching, vat leaching, and in situ leaching. These methods, as discussed in the following paragraphs, were determined inappropriate for the Castle Mountain Project generally because they are applicable to ore with characteristics that are different from those at the Castle Mountain site.

Proposed Heap Leach Method

1. The proposed method for recovering gold from Castle Mountain ores is heap leaching, followed by the carbon adsorption process, as described in detail in Section 3.2.4.3, Heap Leach System. This conventional process is employed at other commercial gold producing operations with similar low-grade, disseminated orebodies.

Flotation

1. The flotation method of gold extraction is used for ores containing appreciable quantities of sulfide minerals. The metallurgical tests have confirmed that the Castle Mountain ores are essentially sulfide-free. Consequently, for metallurgical reasons, flotation would not be suitable for this project.

Carbon-in-pulp Leaching

1. The carbon-in-pulp method of gold extraction is a high energy consumption process used to grind crushed ore material to fine particle sizes that both liberate and expose the maximum mineral surface area. Due to the need for substantial grinding facilities and structures, this alternative process requires considerably more capital investment and would incur greater energy operating costs than the heap leach process. The carbon-in-pulp leaching process produces wet tailings, so that additional capital investment would be needed to construct suitable tailings containment facilities and associated process equipment. Because of these economic considerations, carbon-in-pulp leaching is more appropriate for higher grade orebodies, generally in excess of 0.08 ounce of gold per ton of rock.

2. This alternative appears to offer no environmental advantages over the heap leach process proposed for the Castle Mountain ores. A similar amount of land area is generally required for ore and overburden and the construction of containment facilities and process equipment would be similar to, or greater than, those for the Castle Mountain Project.

Vat Leaching

1. The vat leaching process is somewhat similar to heap leaching, but is conducted in large, shallow tanks. It is an appropriate technique to employ with ores having rapid gold dissolution rates. Typically, the gold from such ores would be extracted in no more than three days. It is more capital intensive than heap leaching, requiring more surface facilities,

particularly the additional investment in leach tanks. It produces the same amount of leached material as the heap leach process. Metallurgical tests of these ores indicate leaching campaigns in excess of 120 days to reach ultimate gold extraction levels. Because of these slow dissolution rates, this process would be inappropriate for the Castle Mountain Project.

In situ Leaching/Carbon Adsorption

1. In situ leaching involves the injection of leaching solution directly into an orebody while it is still in place in the ground. The gold-bearing solution is recovered by pumping from extraction wells and is processed by carbon adsorption. The method requires suitable geologic formations that would confine the solution in the ground until it could be recovered. In the absence of such formations, the potential for adverse effects to ground water and soils could be substantial.

2. While this alternative would not involve open pit mining methods with concurrent ore and overburden removal, it is believed that the risk of ground water and soil contamination would preclude its use for the known Castle Mountain ore deposits.

3.3.2 ALTERNATIVE LOCATIONS FOR PROJECT FACILITIES

1. The overall layout of the proposed Castle Mountain Project has been designed to minimize the area to be disturbed, avoid known cultural and historic resources, minimize visual impacts, reduce potential energy consumption and equipment use through reduced overburden and ore transport distances, and to maximize project efficiency. The rationale for locating project facilities and options for relocation are described below. The facilities and structures proposed for use at the project site are limited to those necessary for efficient operation. The potential for environmental advantages to relocation of planned facilities is addressed in this section.

3.3.2.1 Mine Pits

1. The gold orebody locations are fixed. Consequently, there are no geographical location options for the mine pits. This essentially means that an alternate site location for the Castle Mountain Project is not a viable alternative.

3.3.2.2 Overburden Piles

1. Major considerations in selecting locations for the overburden pile are: (1) minimization of truck haul distance from the mine pits and related costs, (2) adequate storage capacity, (3) requirements to control upstream and downstream drainage, (4) avoidance of sensitive environmental resources, and (5) absence of potential economic mineral reserves in the overburden area.

2. The initial Plan of Operations (B&B Mining, 1987) located the overburden pile in an area about one-half mile east of the current plan location. This proposal was abandoned in order to consolidate project facilities and reduce the project site area when it was determined through exploratory drilling that no significant orebodies were located beneath the westerly area.

3. The proposed overburden location is in the southeastern portion of the project site, as shown in Figure 3.2.5. The overburden pile is configured to limit its extent to within the project site boundaries and has been designed to minimize total land area disturbed, while maximizing operational efficiency. In addition, the site was selected to be as close to the pit locations as possible, to avoid disturbance to known cultural and historic resources and to minimize visual impacts.

4. Possible alternative locations for overburden are offsite, or elsewhere onsite. Offsite disposal of overburden is undesirable because it would involve offsite use of large haul trucks with an increase in transportation costs, and corresponding increases in fuel consumption and pollutant emissions. A comparable area of land would still be required for disposal.

3.3.2.3 Heap Leach Pads

Proposed Location

1. The proposed location of the heap leach pads was determined after consideration of operational and environmental factors. These include proximity to mine areas, efficiency of construction and operation, minimizing land use, and the avoidance of natural drainages and cultural resources. The areas designated for the heap leach pads are located on terrain which is well above the depth of flood waters which occasionally flow in the large natural drainage channel traversing the area. The terrain also has sufficient slope to promote solution drainage and to facilitate construction.

Relocation

1. For purposes of operational efficiency, it is desirable to maintain a consolidated arrangement of project facilities. Therefore, relocation of the leach areas would involve moving the pads either north, northeast, or southeast of their current location. Moving them to the north or northeast would involve the use of more steeply sloping terrain, which would interfere with the principal drainage channel and known cultural and historical resources.

2. Relocation to the southeast would place the pads a greater distance from the mine site, thereby contributing to higher costs and operational inefficiencies. There appears to be no environmental advantage to be gained by leach pad relocation to other areas.

3.3.2.4 Process Facilities and Solution Ponds

Proposed Location

1. The process facilities and solution ponds would require an area site of about 15 acres in size. Because of this, from a physical standpoint, they could be located in any one of several locations having suitable terrain. Technical considerations for locating process facilities include minimizing solution pumping distances and costs, and maximizing security for the project. These facilities have also been located to avoid areas with known cultural resources. Based on these considerations, the proposed process plant and ponds have been located near the planned heap leach pads, as shown in Figure 3.2.5, Preliminary Site Plan. There are no other particular locations that would better satisfy environmental considerations, while meeting technical requirements.

3.3.3 ALTERNATIVE WATER SUPPLY

1. The proposed project would require, on average, approximately 450 gallons per minute of water. A reliable and economical supply of water would be essential to the economic success of the project. Given the semi-arid nature of Lanfair Valley, there are no permanent surface waters that could be used. As a result, available sources considered included:

   - Ground water in Lanfair Valley (West Well Field)
   - Colorado River at Lake Mojave (via pipeline)
   - Ground water from Ivanpah Valley (via pipeline)
   - Ground water from Piute Valley (via pipeline)
   - Trucking water to the site

The hydrologic analysis completed for this EIS/EIR determined that no adverse impact would result from the development and use of ground water in Lanfair Valley, no alternative for reducing an impact is therefore necessary. However, alternatives for project water supply were considered in the project planning and design process and are presented in the following for information purposes.

3.3.3.1 Proposed West Well Field

1. Little information was initially available regarding ground water in Lanfair Valley. The few existing wells were generally shallow and had limited rates of production. Based upon the anticipated costs associated with development of other alternatives for providing water, the Applicant initiated a program to drill, test, and weigh the technical and environmental issues associated with developing a well field in northern Lanfair Valley. A Plan of Operations for exploratory water well drilling was filed with BLM and it was subsequently demonstrated that an available source of water could be developed for project use. Development of the West Well Field would involve no pipeline lift once the water was pumped out of the wells, and the pipeline length would be less than three miles from the center of the West Well Field to the storage tanks at the project site. The water transmission line would be located in an existing road so surface disturbances to offsite vegetation would be reduced. Moreover, the detailed environmental analysis determined that use of this water from Lanfair Valley would not affect other existing or proposed uses of the aquifer and that the majority of water withdrawn would be naturally recharged within 30 years following project completion.

3.3.3.2 Colorado River (Lake Mohave)

1. Development of a water supply from the Colorado River would at minimum include construction of a 34-mile pipeline extending from the vicinity of Cottonwood Cove at Lake Mojave to Searchlight, then along the Searchlight Access Route into the project site. The difference in elevation between Lake Mojave and the highest point along this alignment pipeline would be approximately 3,900 feet, requiring a substantial capital investment for a pipeline able to withstand the hydrostatic pressure associated with this difference in elevation, in addition to the operating costs for electrical power to pump the water. Regulatory problems associated with negotiating an allocation for interstate transfer of water from the Colorado River could also preclude implementation of this alternative.

2. Assuming it were economically and politically feasible, use of water from the Colorado River appears to offer no environmental advantages over the proposed West Well Field. Construction of a 34-mile pipeline would disturb an additional 62 acres of land (based upon an assumed 15-foot construction right-of-way), with potential vegetation, wildlife, and cultural resources impacts.

3.3.3.3 Ivanpah Valley Ground Water

1. Ground water is available in Ivanpah Valley. Development of this source would require construction of a well field in the eastern portion of the Valley, and installation of a 14-mile pipeline and pumps to lift water approximately 2,000 feet in elevation to Lanfair Valley. The pipeline could be constructed adjacent to Ivanpah Road. The capital investment in construction and the operating costs to pump water would be less for this alternative than for the Colorado River alternative, but would still be a substantial economic burden. In addition, the low quality of Ivanpah Valley water could require installation of a treatment plant at the project site to condition the water prior to use in the leaching process.

2. Based upon the anticipated additional length of pipeline construction and treatment facilities, it appears that providing project water from wells in Ivanpah Valley would offer no environmental advantage over the West Well Field.

3.3.3.4 Piute Valley Ground Water

1. It is likely that a water source could be located and developed in Piute Valley. If a well field could be located within 14 miles of the project site then the difference in elevation for the pipeline lift would be less than 800 feet.

2. Providing project water from sources in Piute Valley appears to offer no environmental advantage over the West Well Field. Conversely, it is likely that the pipeline would need to be constructed across WSA 267, which lies between Piute Valley and the site. Construction of such a pipeline would be subject to Interim Management Policy Guidelines (BLM, 1987) for non-impairment of wilderness suitability.

3.3.3.5 Trucking Water to the Site

1. Trucking water from another location outside Lanfair Valley was not considered a practical approach to project operation since about 110 truck loads would need to be delivered to the site each day (based upon a tank capacity of 6,000 gallons).

2. It is expected that use of trucks to deliver project water would be environmentally disadvantageous. The trucks would generate an additional 220 ADT, so total traffic would be about three times that of the proposed action. Air emissions would increase, as well as the potential for impacts to the Ivanpah Valley desert tortoise population. The additional traffic would also increase water requirements for control of fugitive dust.

3.3.4 ALTERNATIVE POWER SUPPLY

1. Peak energy requirements for electrical power to serve the proposed project would be approximately 3,000 kilowatts. Of this, 2,700 kilowatts would represent a relatively steady load. The other 300 kilowatts would be required to meet the transient electrical demand of the primary crushing unit. Such units typically impose large intermittent loads on the electrical system, caused by the crusher motor's need to deliver more power to the crushing unit when a large block of ore enters the crushing cavity. If the electrical system is unable to adequately respond to these large instantaneous load fluctuations, equipment will trip off-line, and the electrical system will fail. The problem of this fluctuating load can be dealt with if a sufficient supply of power is made available, such as from a public utility, or by installing onsite generation equipment with a rapid response time to fluctuating load conditions.

2. Based upon these peak energy and steady load considerations the following alternatives were considered for power supply to the proposed project:

   - Onsite power generation
   - Utility power from Nevada Power Company
   - Utility power from Southern California Edison (Edison)

3.3.4.1 Proposed Onsite Generation

1. Based upon a review of regional power line locations and power agreement negotiations, it was decided that onsite generation would be the most technically and economically feasible alternative. Available methods for such generation include use of engines or turbines burning diesel fuel, propane, natural gas, or combinations thereof. Turbines are not manufactured in

the power output range considered desirable for the project. Diesel engines have good response characteristics for the anticipated fluctuating load demand, but have higher emission levels. Compared to diesel engines, propane- or natural gas-fired engines generate lower emissions but may not respond adequately to the fluctuating load imposed by the primary crusher. In order to satisfy a reliable electrical supply while keeping NOx emissions below the 250-ton Federal annual threshold level, the Applicant proposes to operate two or three gas-fired engines and a single diesel engine. The gas-fired engines would accommodate about 75 percent of the peak load demand, and the diesel engine would be able to respond to the large swinging load demand caused by the primary crusher.

2. The gas-fired engines that would be used would initially burn propane fuel. Propane would be delivered to the site in tanker trucks and would enable timely power start-up. After two or three years of operation, a 4-inch, high-pressure natural gas pipeline is planned to be extended to the site from an existing pipeline in Piute Valley. The Applicant would submit an application for a right-of-way for the pipeline in accordance with Title V of FLPMA. The pipeline would be buried in the shoulder of the Searchlight Access Route. The benefits of using natural gas rather than propane would include reduced emissions, lower fuel costs, a more reliable fuel delivery system, and fewer vehicle trips for propane delivery. Propane storage facilities would remain onsite for backup, in the event of an interruption of natural gas supply.

3.3.4.2 Nevada Power Company Connection

1. The project is located outside of the service area of Nevada Power Company. However, adequate power is available from the Nevada Power grid near Searchlight. Connection would involve construction of a transmission line along the Searchlight Access Route. From an operational standpoint, this alternative would offer the lowest operating cost and an intermediate capital cost when compared to other alternatives. However, certain covenants for the Nevada Power Company restrict its ability to extend service to customers outside its current service area. Based upon consultation with Nevada Power Company regarding its service agreement restrictions, it was concluded that this method of providing power would not be feasible.

3.3.4.3 Southern California Edison Connection

1. The project site is located in the service area of Southern California Edison. However, no transmission lines are available in northern Lanfair Valley. The power line closest to the site

extends from Cima (in Ivanpah Valley) to Vanderbilt at Ivanpah Road (about 12 miles west of the project site). However, this transmission line does not have capacity sufficient to meet the project peak load requirements. Existing powerlines at Goffs, in southern Lanfair Valley, also are inadequate. Adequate capacity is available at Cima; connection at this source would require construction of a transmission line to the site by one of two routes: (1) north from Cima along an existing right-of-way traversing Ivanpah Valley to intersect the Ivanpah Access Route, then along that route to the project site (about 30 miles), or (2) south from Cima to the Cedar Canyon Road, then east through the New York Mountains to Lanfair Road in southern Lanfair Valley and to the site along existing roads or "cross country" (about 31 miles). From a technical and economic standpoint development of either of these transmission lines would be difficult based on: (1) negotiations that would be necessary with numerous private landowners in Lanfair Valley for construction rights-of-way, (2) substantial capital cost to construct a power line and, (3) the likelihood that delays in negotiating permits and rights-of-way agreements would prohibit construction and "on-line" availability on a timely basis concurrent with project start-up.

2. The environmental advantage for a Southern California Edison power connection would primarily be the reduction in potential project air emissions that would occur using onsite generators. However, a disadvantage of this power line would be the potential visual impact, since about 10 miles of the line would be adjacent to portions of WSA 265 (for either route). Assuming negotiations could be completed and the power line would be economically feasible, there is no substantial environmental advantage over the proposed onsite generation.

3.4 ALTERNATIVES TO THE PROPOSED ACTION

1. Based upon review of the possible alternatives to the proposed action, one alternative was found to be feasible and provide the potential to reduce the project's level of environmental impact. This alternative, known as the Ivanpah Access Route Alternative, is described in this section. In addition, the No Action Alternative, required by both the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA) guidelines, is described. These alternatives are considered throughout the remaining chapters of this document.

3.4.1 IVANPAH ACCESS ROUTE ALTERNATIVE

1. The Ivanpah Access Route Alternative is a variation of the proposed action that would involve an alternate location for vehicle access. The Applicant has proposed the use of two access routes in the Proposed Action for the convenience of project employees that are expected to live in communities along U.S. Highway 95 east of the site. The alternative would involve implementation of the proposed Castle Mountain Project, but no access improvements would be completed along the Searchlight Access Route from the east. This alternative was conceived during the scoping process, when improvement of the Searchlight Access Route was questioned because of concern for potential impacts to the Piute Valley desert tortoise population, as well as the potential for increased off-road vehicle access to the northern Castle Mountains, New York Mountains, and Lanfair Valley. Since no Searchlight Access Route would be constructed, total project surface disturbance would be reduced by about 20 acres (or about two percent).

2. The Ivanpah Access Route Alternative would leave the unimproved dirt roadway between Searchlight and the project site as it presently exists as Clark County Road A68P, and trails established by use. In their existing condition, these roads are not suitable for daily access by project personnel and the likelihood of project traffic using that route would be limited. With this alternative, employees traveling to the site from communities to the east (along U.S. Highway 95) would travel westerly from Searchlight via State Route 164 through Nipton to Ivanpah Road and thence to the site along the Ivanpah Access Route. This would increase travel distance from the east by about 27 miles (or an additional 1/2-hour commute) as shown in Table 3.4.1, Road Distance and Travel Time Comparison, Proposed Action and Ivanpah Access Route Alternative. Nearly all project traffic (about 102 ADT) would be expected to use

TABLE 3.4.1

ROAD DISTANCE AND TRAVEL TIME COMPARISON PROPOSED ACTION AND IVANPAH ACCESS ROUTE ALTERNATIVE

ROUTE	DISTANCE/TIME TO SITE			
	FROM LAS VEGAS (at U.S. Hwy 95/Hwy 146)		FROM U.S. HIGHWAY 95 AT SEARCHLIGHT	
	MILES	TIME[1]	MILES	TIME[1]
PROPOSED ACTION (with Searchlight Access Route)	63	1 hr., 20 min.	20	30 min.
IVANPAH ACCESS ROUTE ALTERNATIVE [2] (without Searchlight Access Route)	96	1 hr., 55 min.	53	65 min.

[1] Assumes road improvements completed with average travel speed of 60 mph on paved roads, and 35 mph on dirt roads.

[2] Calculated route is from Las Vegas to Searchlight via U.S. Highway 95, then west on Nevada State Highway 164 through Nipton to the intersection with Ivanpah Road.

Ivanpah Road under this alternative, although a limited number of employees could still choose to access the site along the unimproved Searchlight Access Route (estimated at 6 ADT).

3. While no Searchlight Access Route road would be constructed under this alternative, the Applicant would plan to extend a natural gas pipeline along that general alignment within existing roads. An application for a right-of-way for the pipeline would be required in accordance with Title V of FLPMA.

3.4.2 NO ACTION ALTERNATIVE

1. Consideration of the No Action (or No Project) alternative is required by NEPA and CEQA regulations. Such action would generally be inconsistent with Federal and State policy encouraging mineral development and would generally deny the claimant his legal right to extract minerals on his claim. However, this alternative could be adopted by BLM if the proposed action would result in "unnecessary or undue degradation" of Federal lands.

2. Implementation of this alternative would mean that the Castle Mountain Project would not be developed under this proposal. The site would remain in its present state, and no potential for increased environmental impacts would occur. Surface disturbances that have been created by historic mining events would remain, and the present uses for mining, grazing, and recreation would continue. The site would be available for future commercial gold processing proposals or for other proposals as permitted by BLM policy and County land use designations.

3. The project site is in an established mining area and is planned for continued mining uses by the County. The area is designated as Class L (Limited Use) in the California Desert Conservation Area Plan and East Mojave National Scenic Area Plan. These plans and Federal policies provide for multiple land use, including mining, subject to appropriate measures to prevent unnecessary or undue degradation.

CHAPTER 4.0
DESCRIPTION OF THE EXISTING ENVIRONMENT

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 INTRODUCTION

1. For purposes of environmental analysis, regional and site-specific project study areas were defined. The regional study area was delineated as the Lanfair Valley basin. Lanfair Valley covers some 340 square miles and is physically bounded by mountains, as shown in Figure 4.1.1, Regional Study Area (Lanfair Valley). For some issues, such as land use and socioeconomics, areas outside of Lanfair Valley are considered (i.e. grazing along the access routes and communities where employees would live). The project site study area is depicted in Figure 4.1.2, Project Site and Access Routes Study Area. The 2,735-acre project site and an encompassing area covering about 49 square miles was inventoried for resources such as vegetation and wildlife. These resources were also inventoried along the proposed access routes. Archaeological resources were inventoried over a more limited potential impact area covering the project site, Searchlight Access Route and natural gas pipeline alignment, and well sites, both within the West Well Field and in the vicinity of Piute Spring. The inventory was coordinated with the U.S. Bureau of Land Management (BLM).

2. Piute Spring is located in the southern Piute Range. The spring, which drains easterly towards Piute Valley, is studied under the issue of hydrology because of its ecological importance and relationship to Lanfair Valley ground water.

3. The proposed Searchlight Access Route was also considered, including the proposed 10.8 miles of improvement (westerly portion) and the existing 9.5-mile Clark County Road A68P (easterly portion). Based upon an approximate 16-foot road width, the 10.8-mile segment would encompass about 20 acres of land. Of this, about 7 acres would be involved in the 3.3 miles of new road construction.

4. Sections 4.2 through 4.12 provide descriptions of the environment in the vicinity of the project as it currently exists. The area is described for each environmental issue from regional and local perspectives, as necessary. A general overview of the regional and local environment is provided in the remainder of this section.

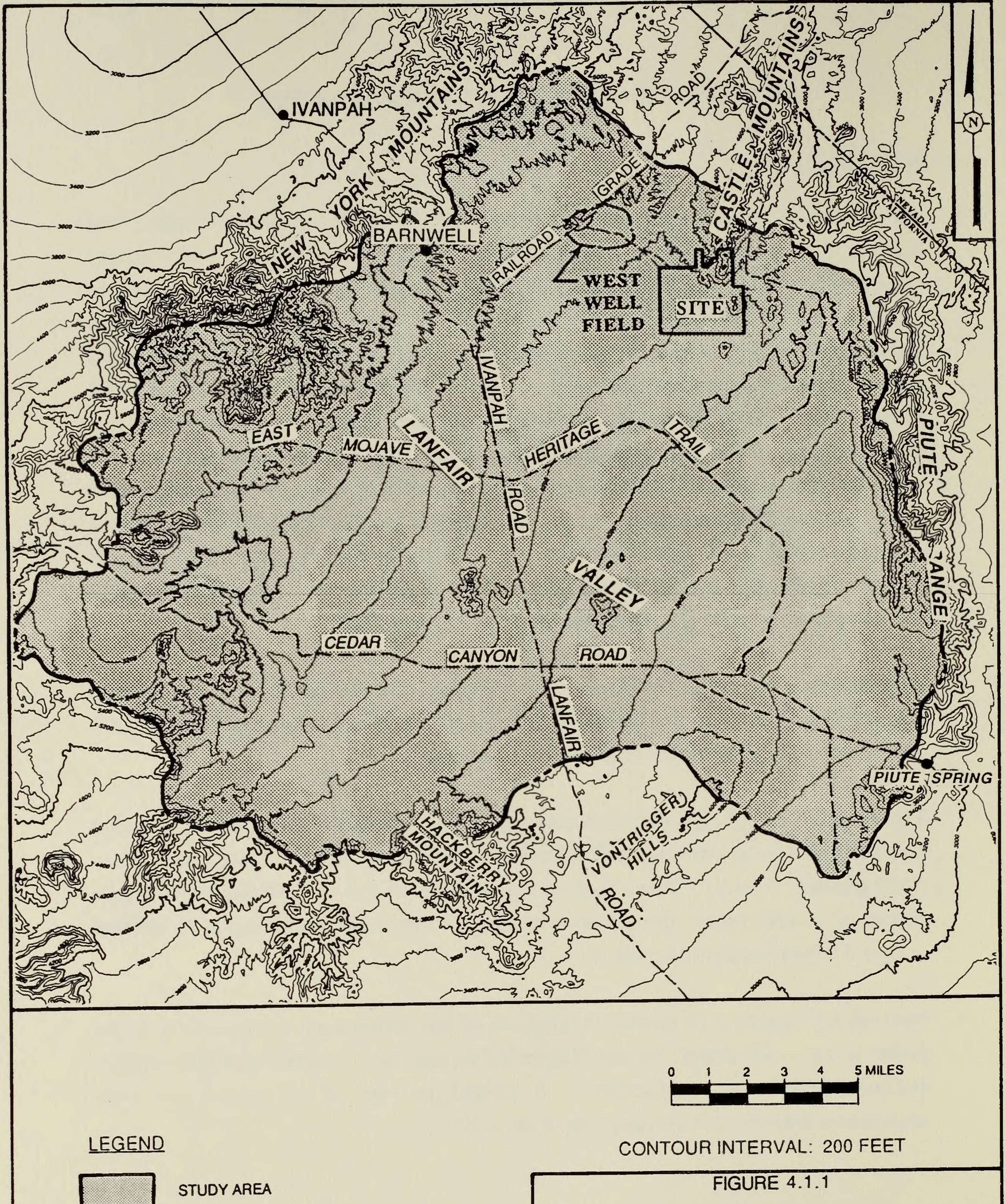

FIGURE 4.1.1

REGIONAL STUDY AREA (LANFAIR VALLEY)

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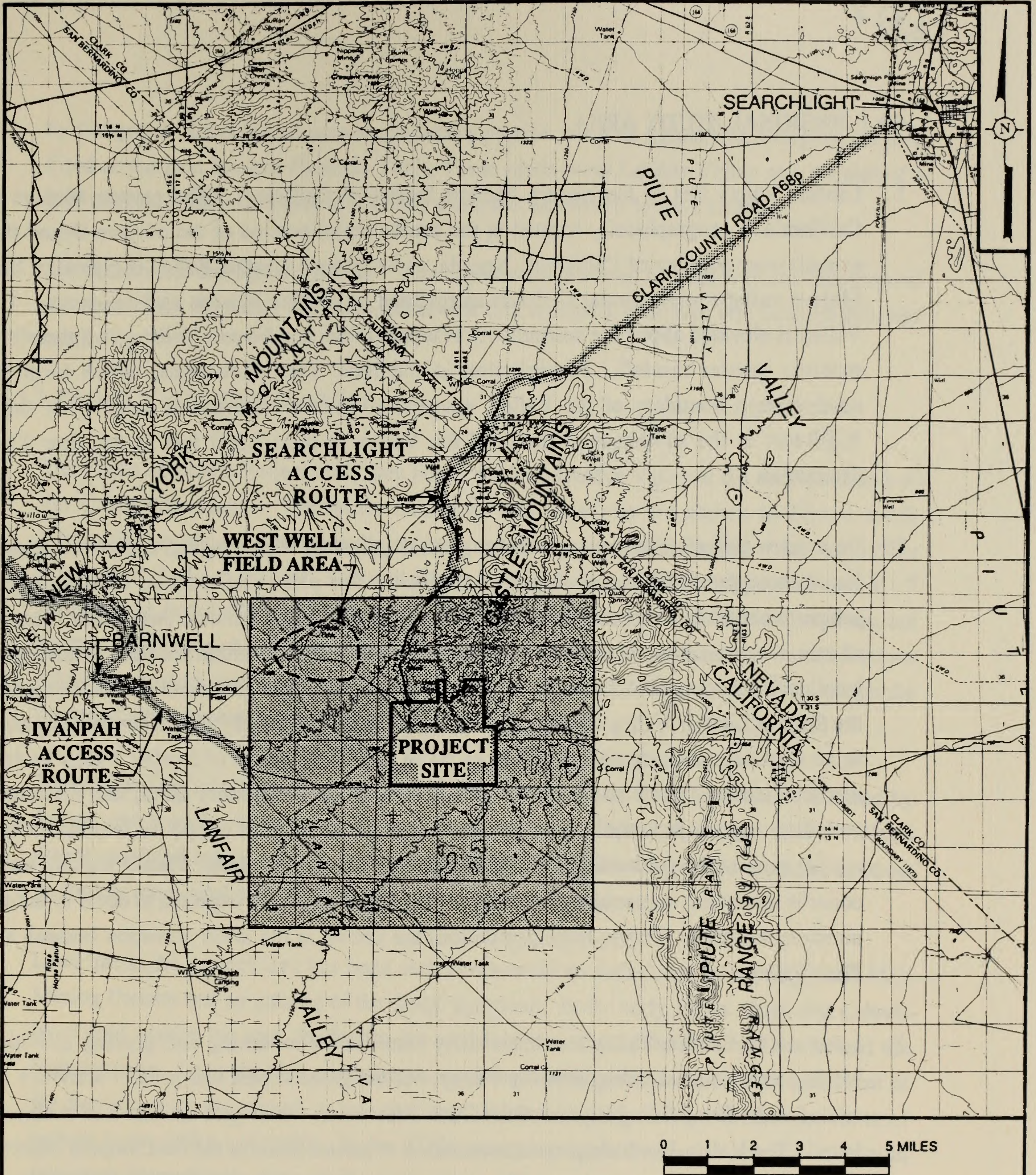

LEGEND

STUDY AREA

CONTOUR INTERVAL: 50 METERS

FIGURE 4.1.2

PROJECT SITE AND ACCESS ROUTES STUDY AREA

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BASE MAP: U.S.G.S. 1:100,000 SERIES TOPOGRAPHIC MAPS OF DAVIS DAM AND IVANPAH

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4.1.1 REGIONAL STUDY AREA

1. Lanfair Valley lies in the eastern Mojave Desert of California. The eastern Mojave of California is geographically located in the south-central portion of the Mojave Desert that extends over portions of California, Nevada, and Arizona. Lanfair Valley is typical of East Mojave valleys with alluvial flatlands surrounded by sloping bajadas and mountains. The Valley is elevated above the surrounding Ivanpah, Piute, and Fenner Valleys and, therefore, receives greater rainfall. Precipitation in the New York Mountains, which form the northwestern boundary of the Valley, exceeds 10 inches. Elevations range from about 3,200 feet at the southeastern limits of the Valley to over 7,500 feet in the New York Mountains.

2. Vegetation and wildlife species in this region are generally wide-ranging, and are commonly found throughout the Mojave Desert. Representative plant communities include pinyon juniper woodland, blackbush scrub, Joshua tree woodland, and creosote bush scrub. Species of rare occurrence or restricted range may also be found in certain locales, indicative of localized climatic and soil conditions. An understory of desert grassland occurs throughout the floor of Lanfair Valley. This grassland, which covers about 200,000 acres, is recognized as an unusual plant assemblage (UPA) by BLM. Wildlife typical of Lanfair Valley include reptiles such as lizards and snakes, various resident and migratory birds, and mammals, including coyote, jackrabbit, desert woodrat, and mice. Species of special interest include raptors such as the golden eagle, prairie falcon, and Swainson's hawk. Desert bighorn sheep occur in mountains surrounding the Valley. The desert tortoise is expected to occur in limited numbers in Lanfair Valley; large populations are known in the lower elevation Ivanpah and Piute Valleys.

3. Land use in Lanfair Valley has historically been linked to mining and grazing activities. Mining has occurred throughout the Valley, but the greatest past and present activities are related to the Hart Mining District of the Castle Mountains, where gold and fine kaolin clay are found. The Valley has the highest concentration of private lands in the East Mojave Desert, a legacy of agricultural settlement early in this century. Cattle graze Lanfair Valley and adjacent areas on BLM grazing allotments. The East Mojave National Scenic Area (EMNSA) extends over this region of the Mojave Desert, including Lanfair Valley, and there are designated wilderness study areas (WSA) in the surrounding mountain ranges. Some of these areas are recommended by BLM for inclusion in the wilderness preservation system, to be considered

by Congress. Recreational uses are generally passive, such as sightseeing along the Mojave Road or the East Mojave Heritage Trail. These roads cross Lanfair Valley and are part of a network of dirt trails that have historically traversed the eastern Mojave Desert.

4. Access into and throughout Lanfair Valley is generally provided by improved and unimproved dirt roads from the west (via Cima), northwest (via Ivanpah), northeast (via Searchlight), and south (via Goffs).

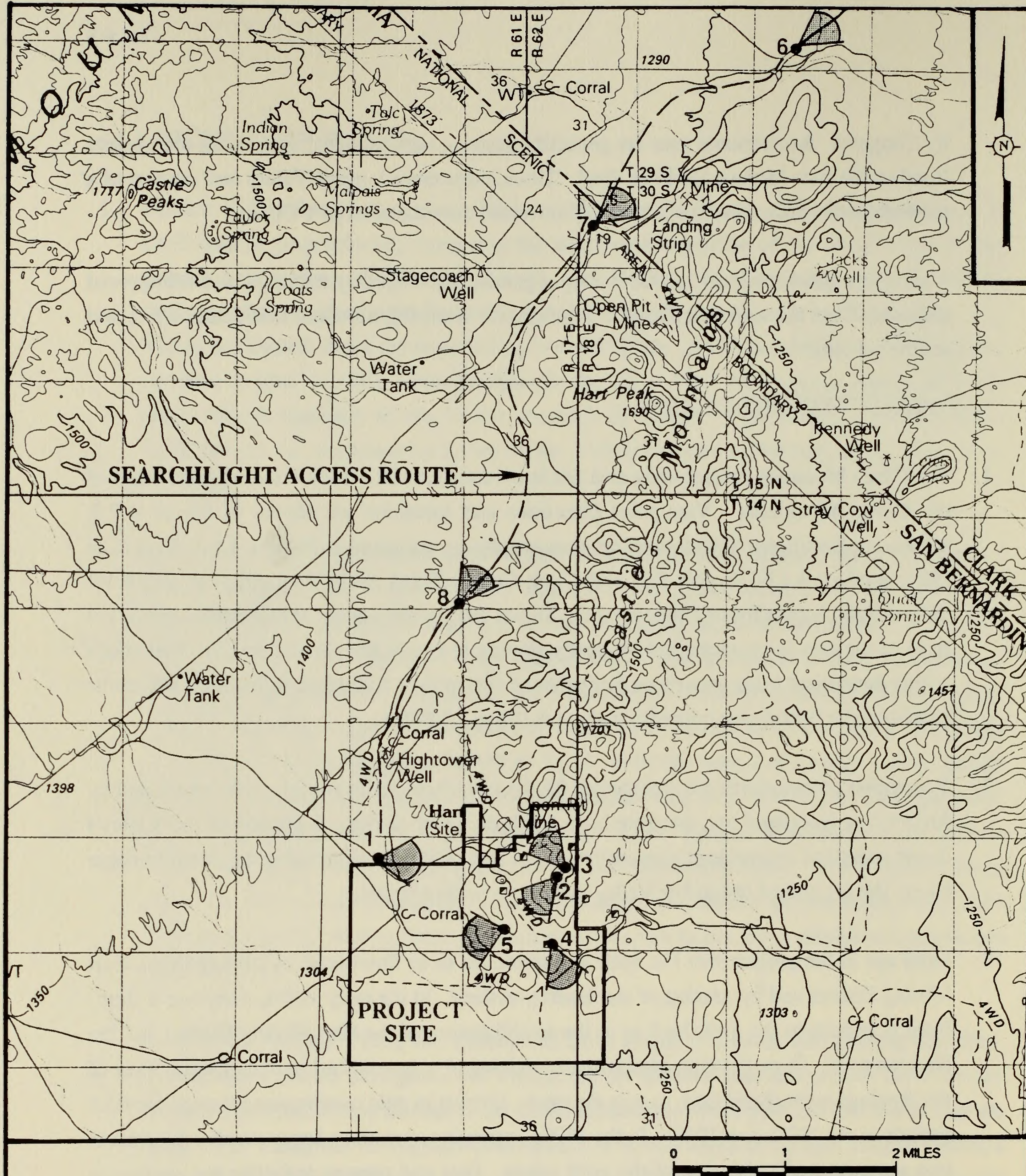
4.1.2 PROJECT SITE STUDY AREA

1. The Castle Mountain Project study area lies in northern Lanfair Valley at the southern limits of the Castle Mountains. Viewpoint directions and locations are shown in Figure 4.1.3, Viewpoint Locations. Corresponding photographs are presented in Figures 4.1.4, 4.1.5 (Site Photographs), 4.1.6 (Project Site and Clark County Road A68P Photographs), and 4.1.7 (Searchlight Access Route Photographs). Slopes and canyons occur at higher elevations, but most of the area is characterized by gently sloping to nearly flat alluvial terrain. Elevations within the project study area range from about 4,000 to over 5,200 feet. Elevations within the proposed site boundaries range from about 4,100 to 5,100 feet.

2. Vegetation communities are represented by the blackbush scrub at higher elevations and by Joshua tree woodland and creosote bush scrub on lower slopes. A portion of the Valley's desert grassland assemblage also occurs on the site. Wildlife observed or expected to occur on the site are typical of Lanfair Valley in the surrounding region.

3. Land use in the project area has been and continues to be dominated by mining in the Hart Mining District and by grazing of the desert grassland. In the early 1900s, there was a short-lived gold rush to the area, leading to the establishment of the Hart Mining District and the Hart townsite. Once the high-grade ores containing visible gold had been extracted, most of the diggings were abandoned, as was the town. Interest in gold mining was renewed for brief periods in the 1930s and 1940s. In the 1920s, quarrying operations began on clay deposits in two areas immediately west of the gold mines. Past and present activities are evidenced by mine works, shafts, roads, and the open clay pits.

4. From the proposed project site, the proposed 20.3-mile Searchlight Access Route follows alluvial basins in northern Lanfair Valley to the alignment of the former Barnwell and



CONTOUR INTERVAL: 50 METERS

LEGEND

- APPROXIMATE VIEWPOINT LOCATION
- DIRECTION OF VIEW

BASE REFERENCE: U.S.G.S. 30 x 60 MINUTE SERIES TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA, AND DAVIS DAM, NEVADA, BOTH DATED 1985

FIGURE 4.1.3

VIEWPOINT LOCATIONS

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VIEWPOINT 1: View of Castle Mountains from Hart Mine Road. Big Chief Hill clay pit is visible at right. Heap leach piles would be located on alluvial terrain at right. Lesley Ann pit would be approximately at center behind low hill. View southeast.

VIEWPOINT 2: View over drainage that would be occupied by Lesley Ann pit. Heap leach piles would be located on alluvial terrain at upper right. Big Chief Hill is at right center, with portion of clay pit visible at right. New York Mountains are visible at top right. View southwest.

FIGURE 4.1.4

SITE PHOTOGRAPHS

CASTLE MOUNTAIN PROJECT

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For photograph location, refer to Figure 4.1.3.

VIEWPOINT 3: Upper limits of drainage that would be occupied by Oro Belle pit. Castle Peaks in New York Mountains are visible above ridge at left. View northwest.

VIEWPOINT 4: Low hills in area of proposed overburden pile, Distant mountains are part of Piute Range. View southeast.

FIGURE 4.1.5

SITE PHOTOGRAPHS

CASTLE MOUNTAIN PROJECT

For photograph location, refer to Figure 4.1.3.

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VIEWPOINT 5: View across Lanfair Valley from southern limit of Big Chief Hill. New York Mountains are at top center. Crushing area would be located at left with overland conveyor extending across to heap leach pads that would be located at lower elevations in center of photograph. View west.

VIEWPOINT 6: Clark County Road A68P. Searchlight is at base of mountains in top center of photograph. This road was constructed on the former alignment of the Searchlight to Barnwell Railroad. View northeast.

FIGURE 4.1.6

PROJECT SITE AND CLARK COUNTY ROAD A68P PHOTOGRAPHS

CASTLE MOUNTAIN PROJECT

For photograph location, refer to Figure 4.1.3.

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VIEWPOINT 7: Unimproved dirt trail west of County Road A68P. This segment of the Searchlight Access Route would be graded and realigned. View northeast.

VIEWPOINT 8: This segment of Searchlight Access Route would require new road construction through undisturbed terrain on valley floor. View north-northeast.

FIGURE 4.1.7

SEARCHLIGHT ACCESS ROUTE PHOTOGRAPHS

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For photograph location, refer to Figure 4.1.3.

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Searchlight Railway (see Figures 4.1.6 and 4.1.7). The easterly 9.5 miles of this route has been graded and is a County-maintained roadway (Clark County Road A68P). The westerly 10.8-mile portion which leads to Lanfair Valley has been established by use and is not maintained. Various dirt roads traverse this area. Cattle graze along the southern portion of this route as part of the Lanfair Valley grazing allotment, and the eastern segment of the route as part of the Crescent Peak grazing allotment.

5. The 27.2-mile long Ivanpah Access Route follows paved and unpaved roads from the intersection of Ivanpah Road/Nipton Road southeasterly across Ivanpah Valley and through the New York Mountains to Lanfair Valley. The westerly 10.9 miles of this route are paved and maintained by the County of San Bernardino. The County also maintains the approximate 7.5 miles of dirt road that pass through the New York Mountains. The remaining 8.9 miles of Hart Mine Road traverse the floor of Lanfair Valley through Joshua tree woodland/creosote bush scrub to the project site (see Figure 4.1.4).

4.2 GEOLOGY

1. Geologic conditions of the Lanfair Valley region and project site discussed below include landforms (physiography), faulting, and earthquake potential, and mineral and paleontological resources. The potential effects of earthquakes on project facilities, and the project's impact on mineral and paleontological resources are addressed in Section 5.2.

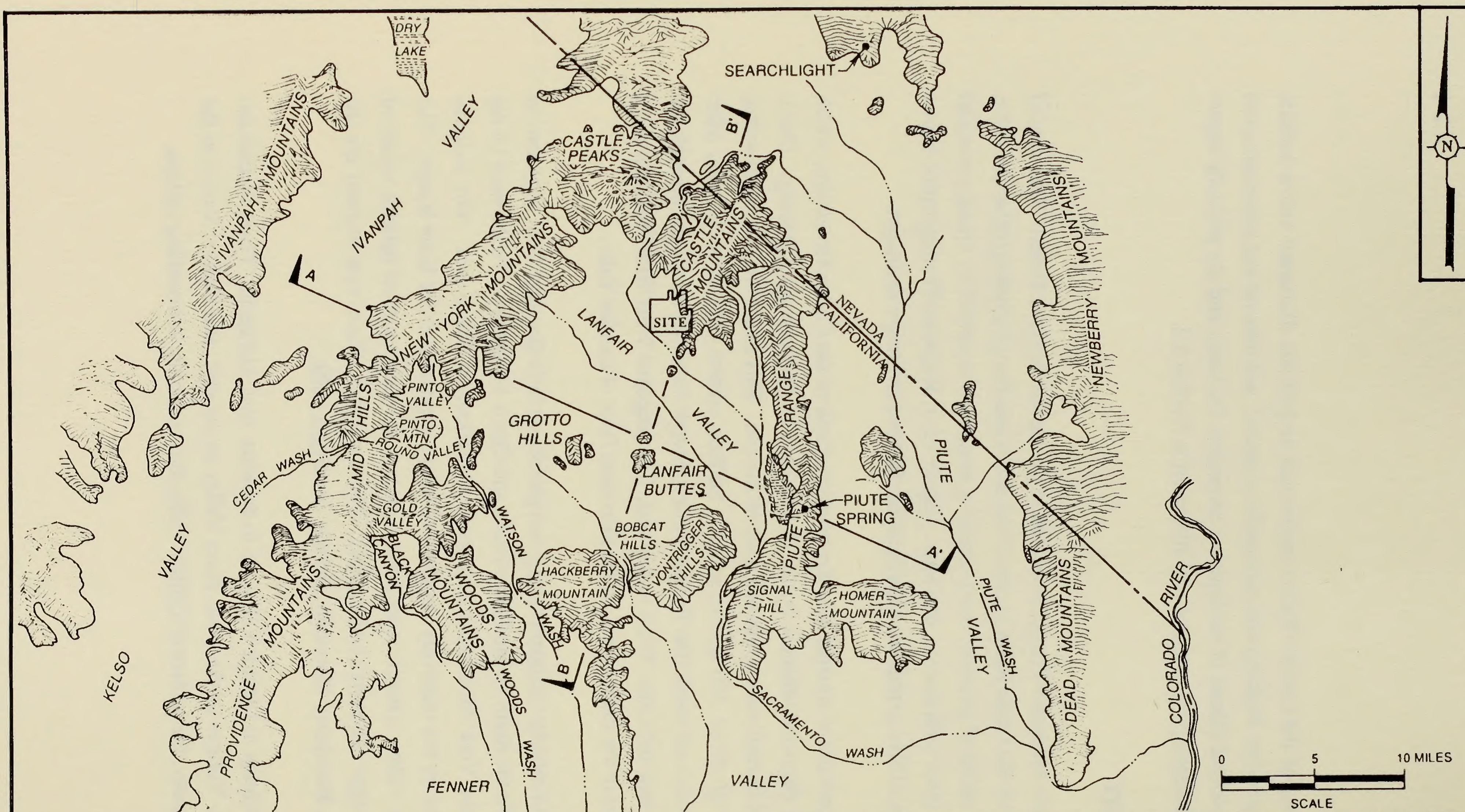
4.2.1 PHYSIOGRAPHY

1. The proposed Castle Mountain Project is located in the eastern Mojave Desert. This area of the Mojave is part of the Great Basin region of the Basin and Range physiographic province, characterized by a series of generally north-trending mountains separated by broad, low-relief alluviated basins, often with internal drainage. Figure 4.2.1, Regional Physiography, shows the project location relative to regional physiographic features and major drainages.

2. The proposed project site is situated near the southern flank of the Castle Mountains, which represent a highly degraded volcanic center of a caldera of Miocene age (Jennings, 1961). Lanfair Valley lies immediately south and west of the site. This extensive low-relief valley occupies an area of about 340 square miles. Surface waters (which occur only after precipitation events) drain south into Fenner Valley, except for small drainages through the Piute Gorge to the east and Cedar Wash to the west. The proposed West Well Field lies about two miles northwest of the mining area, on the alluviated floor of Lanfair Valley.

3. Lanfair Valley is rimmed by mountain ranges and prominent hills that vary from very low- to very high-relief. To the north lie the Castle Peaks and Castle Mountains. To the west lie the Mid Hills and New York Mountains that attain elevations of 7,500 feet. The easterly boundary is formed by the relatively narrow and linear, moderate-relief Piute Range. The south margin of the Valley is bordered by three main low- to moderate-relief uplands separated by alluviated drainage channels (water gaps). These uplands (from west to east) are the Woods Mountains, Hackberry Mountain, and the Vontrigger Hills.

4. Alluviated basins similar to Lanfair Valley lie to the west, east, and south. These include the Ivanpah and Kelso Valleys to the west, Piute Valley to the east, and Fenner Valley to the south. Topographically, the surface of Lanfair Valley lies above the surrounding valleys.



LEGEND

A A' CROSS-SECTIONS

—··· — MAJOR SURFACE DRAINAGES

NOTE: SEE FGURE 4.2.2 FOR CROSS-SECTIONS.

FIGURE 4.2.1

REGIONAL PHYSIOGRAPHY

CASTLE MOUNTAIN PROJECT

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5. Two profile sections across Lanfair Valley and adjacent ranges and basins depict the relative topographic expression of the region, as shown in Figure 4.2.2, Lanfair Valley Geologic Cross-Sections.

6. Physiographic conditions along the proposed Searchlight Access Route are shown in Figure 3.2.10, Proposed Access Routes and Improvements. These vary from:

   - Gently to moderately sloping conditions along the northwestern edge of the Castle Mountains from the site to the California/Nevada border where a new section of road would be constructed, to
   - nearly flat conditions along the existing County Road from the State line to Searchlight, Nevada.

   The new portion of road would be aligned so that large cut or fill areas would not be required.

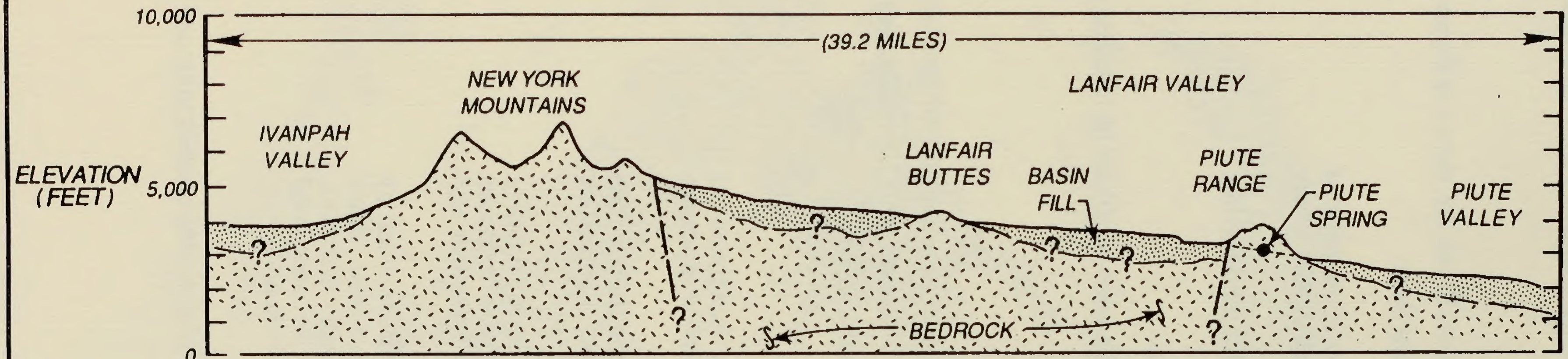
4.2.2 GEOLOGY

1. Geologic conditions of Lanfair Valley and surrounding region are diverse and involve geologic history that dates back into pre-Cambrian time. In a general sense, the following briefly outlines the sequence of geologic events that occurred in the region:

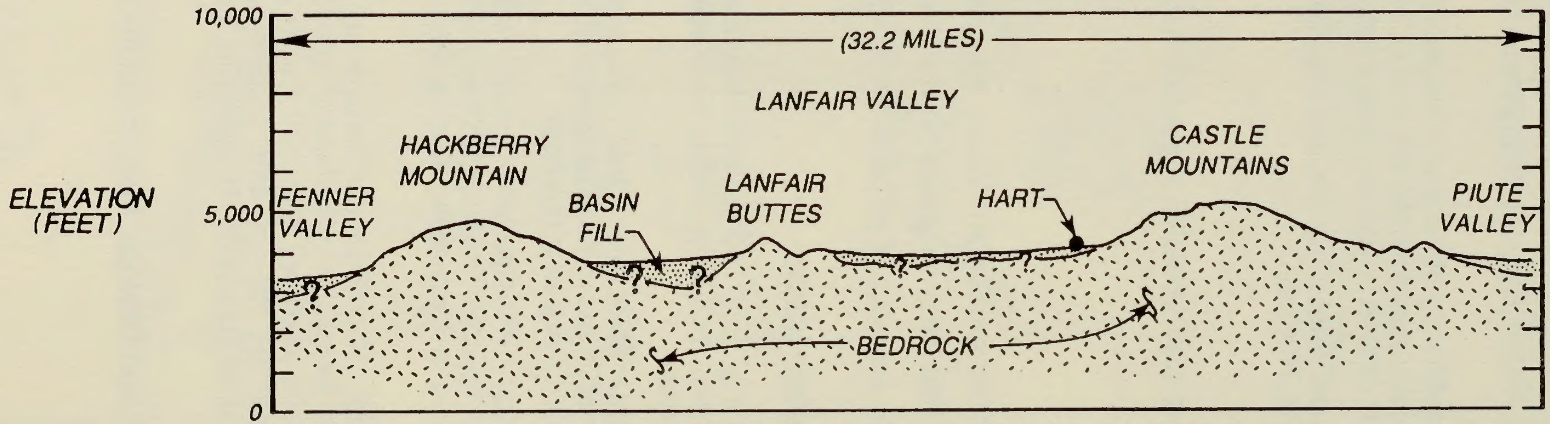
   Summary of Geologic History:

   - Pre-Cambrian Era: Regional basement complex consisted of metamorphosed intrusives and ancient sedimentary units of unknown types and extent.
   - Paleozoic Era: Miogeosynclinal sedimentary units deposited over the region, derived from the east and thickened toward the west. Vast marine seas occupied the region at this time.
   - Mesozoic Era: Withdrawal of marine seas, followed by detachment faulting from the mid Triassic Cordilleran thrust belt. Granite intrusions were implaced in Cretaceous time in the form of small batholiths and stocks.
   - Cenozoic Era: Middle to late Tertiary age volcanism accompanied by extensional deformation in the form of normal fault displacements. Basin bounding faults produced horst and graben (basin and range) structures. Basin filling by fluvial and lacustrine processes accompanied downdropping of the basins. Basin filling has continued to the present.

   Figure 4.2.3, Regional Geologic Map, shows the distribution of the various bedrock units and major structures.



SECTION A-A', LOOKING NORTHEAST



SECTION B-B', LOOKING NORTHWEST

HORIZONTAL SCALE: 1 INCH = 5 MILES

VERTICAL SCALE: 1 INCH = 5,000 FEET

FIGURE 4.2.2

LANFAIR VALLEY GEOLOGIC CROSS-SECTIONS

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NOTE: SEE FIGURE 4.2.1 FOR CROSS-SECTION LOCATIONS.

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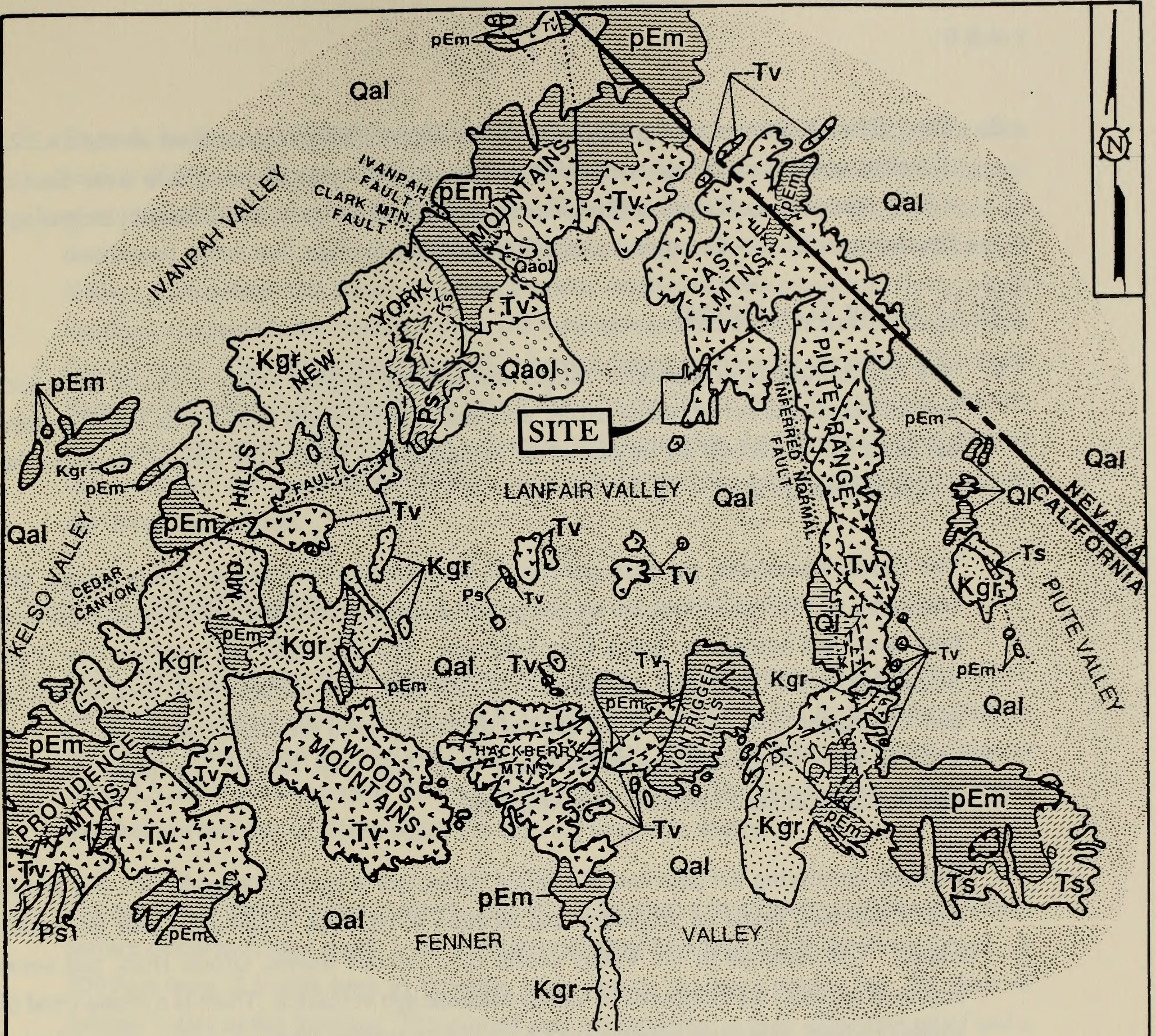

EXPLANATION:

	(Qal)	RECENT BASIN ALLUVIUM
	(Qaol)	PLEISTOCENE BASIN ALLUVIUM
	(Ol)	PLEISTOCENE LACUSTRINE DEPOSITS
	(Ps/Ts)	PALEOZOIC/TERTIARY SEDIMENTARY ROCKS
	(Qv/Tv)	OUATERNARY/TERTIARY EXTRUSIVE VOLCANICS
	(Kgr)	CRETACEOUS INTRUSIVE GRANITICS
	(pEm)	PRECAMBRIAN METAMORPHIC/GRANITIC BASEMENT

FAULTS, DASHED WHERE APPROXIMATE, DOTTED WHERE CONCEALED. BARB (Δ) INDICATES A THRUST FAULT.

0 5 10 MILES

SCALE

REFERENCE: MODIFIED AFTER JENNINGS 1961 AND 1966 AND LONGWELL ET AL. 1965

FIGURE 4.2.3

REGIONAL GEOLOGIC MAP

CASTLE MOUNTAIN PROJECT

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2. The following discussion of geologic conditions is provided in two sections. Section 4.2.2.1 describes conditions throughout Lanfair Valley, including the proposed site area. Section 4.2.2.2 describes conditions at Piute Gorge, as background material for later hydrogeologic discussions related to the origin and conditions at Piute Spring.

4.2.2.1 Lanfair Valley Geology

1. The Castle Mountains and other ranges surrounding Lanfair Valley typically have been uplifted relative to the adjoining basins, presumably along faults that now lie buried beneath the basin fill. Although the origins of the mountains are structurally similar, the rocks that compose them are not.

2. The Castle Mountains, northern portion of the New York Mountains, Piute Range, and Hackberry and Woods Mountains are composed of extrusive Miocene age volcanic rocks with lava flows and pyroclastic ejecta from volcanos. The Mid Hills and southern New York Mountains have a Cretaceous age intrusive granitic core. The northern New York Mountains and Vontrigger Hills consist of the ancient metamorphosed pre-Cambrian terrain. A wide band of early Paleozoic age sedimentary units has been faulted into place near the eastern/central limits of the New York Mountains.

3. Bedrock underlying the alluvium of Lanfair Valley lies at estimated depths of a few feet to over 1,000 feet, based on projection and location of outcrops (inselburgs) near the Valley center. The outcrops in the Valley center (i.e., Lanfair Buttes, Grotto Hills, and some unnamed uplands) are composed of mostly Miocene age volcanics. There is a strong trend of aligned bedrock exposures between the Castle and Hackberry Mountains, suggesting a buried shallow ridge near this location. Such a subsurface ridge may divide the basin into two roughly equal parts.

4. Recent alluvium has filled Lanfair Valley. The alluvium was derived from the surrounding uplands, transported into the Valley, and deposited by stream action on outwash plains and alluvial fans. Older alluvium of Pleistocene age is exposed along the northwest valley perimeter and represents earlier stages of alluvium. Calichefied (calcium carbonate) soils have discontinuously developed within the near surface portion of both the older and younger alluvial deposits, forming a relatively resistant mantle.

5. Exposed in the southeastern part of Lanfair Valley and adjacent to the Piute Range is a thick section of clay-rich Pleistocene age lacustrine (lake) deposits. These deposits have a thickness of at least 550 feet and may be as thick as 1,000 feet in some locations. Based on widely distributed water well information, the lake deposits may underlie at least half of Lanfair Valley. Interbedded with the lake deposits are thick sections of Pleistocene lava flows, which locally are exposed in the lakebed section and were encountered in water well drillings (Mark Group, 1988). The ancient lake presumably formed during and/or after the uplift of the Piute Range, which essentially dammed the Valley along its eastern margin. No evaporite deposits have been identified within the lake sequence, indicating that the lake was being drained (decanted) and that it was not part of the extensive integrated playa lake system that occupies the Great Basin region.

4.2.2.2 Piute Gorge Geology

1. Piute Gorge is an east-west, irregular-shaped, deeply incised stream channel that drains surface flows from a small drainage area in southeastern Lanfair Valley through the southern end of the Piute Range and eastward into Piute Valley. The Piute Range at this location is about 1.5 miles wide and up to 700 feet above Piute Valley. The stream floor varies from a few feet to a few tens of feet in width and has very steep side slopes.

2. The ephemeral canyon drainage above Piute Spring captures a small amount of Lanfair Valley surface drainage from a small, 5-square mile watershed area adjacent to the Piute Range. A 300-foot deep, 1.5-mile long by 0.5-mile wide canyon has been eroded into the floor of Lanfair Valley at this location. This eroded area has moderate to high side slope relief and a rather flat floor. Pleistocene age lake beds are exposed continuously along the walls. A 20- to 30-foot thick section of caliche (mostly gravels) mantles the lake beds, forming a hard, resistant layer.

3. Figure 4.2.4, Conceptual Geologic Cross-Section through Piute Gorge, shows a cross-section of geologic conditions observed along the canyon axis. Andesitic volcanic flows and interbedded welded tuff breccias are exposed continuously along the canyon walls, through the Piute Range. Locally, bedrock is exposed on the canyon floor, especially at water fall and plunge pool locations. The bedrock varies from relatively fresh and very fractured to very weathered and massive. Approximately 80 percent of the exposed rock above Piute Spring

was judged to be very fractured and could have a relatively high hydraulic conductivity. Twenty percent of the rock was judged to have a moderately low hydraulic conductivity, due to weathering and its massive character.

4. Numerous normal tensional faults were mapped trending north-south and dipping westward at 50 degrees or higher within the canyon. All faults display displacement dipping down to the west with a few to several hundred feet of vertical offset. Faulting has caused the section to repeat a few times, as observed along the canyon bottom. Clay gouge and brecciated zones several feet thick lie parallel to the fault planes and, in general, are well-cemented. The local relief within the range (i.e., canyons and ridges) is obviously controlled by this faulting. East-west trending faults also were observed, most likely representing zones of weakness along which drainages have developed, especially near Piute Spring. A major west-dipping fault which bounds the range was noted at the upper gorge mouth and appears to juxtapose alluvial-lake deposits of Lanfair Valley against the volcanics that comprise the Piute Range.

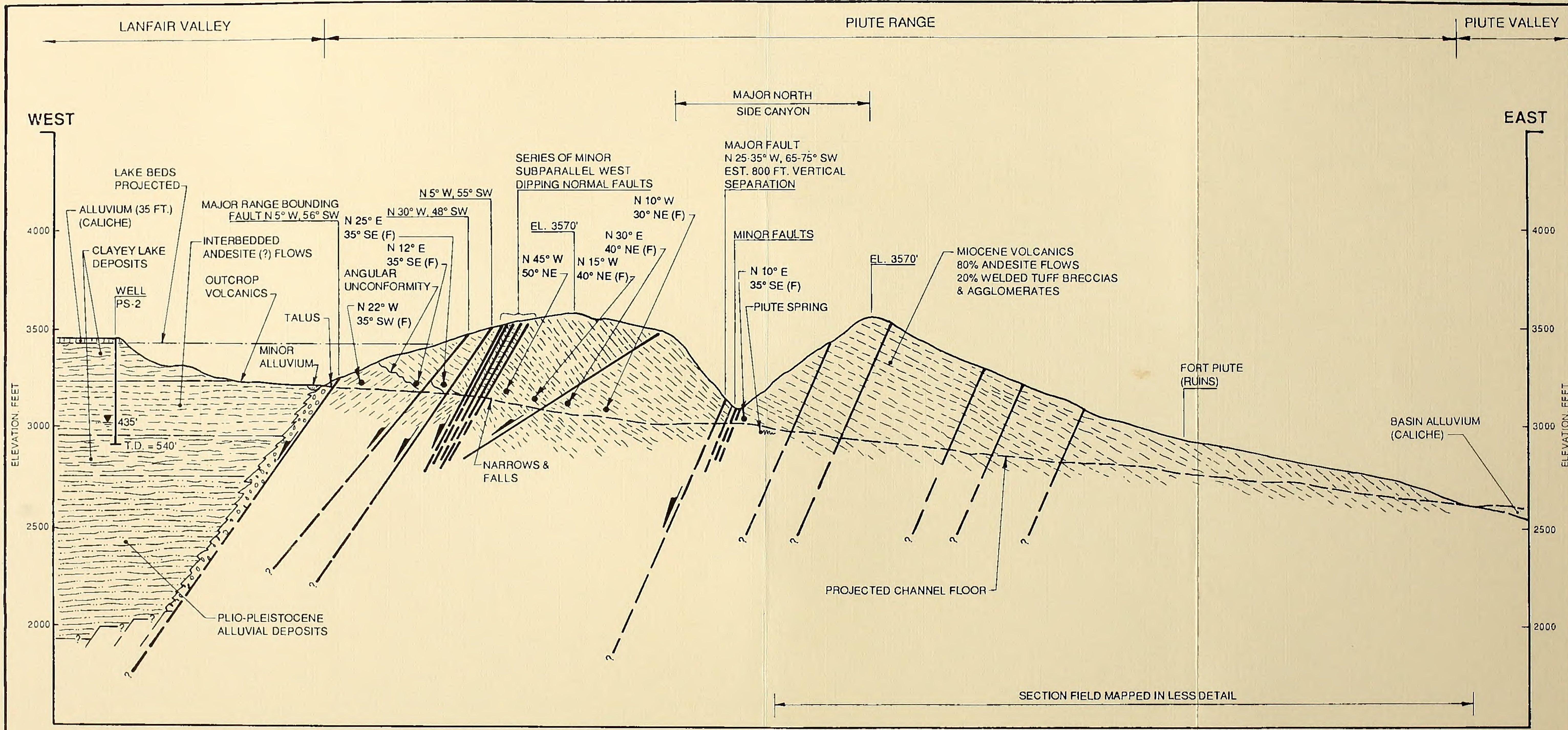
5. The gradient of the Piute Gorge floor is relatively steep. A local steepening is apparent just above and continuing east of first point of emittance of Piute Spring and appears to be fault controlled.

6. Piute Spring can be considered a bedrock spring (resulting from flow through the volcanic bedrock), although some alluvium has been deposited in the floor of the canyon and downstream as it blends into alluvium in Piute Valley.

4.2.3 FAULTING

1. Numerous faults of every kind have been mapped in the Castle Mountains and around Lanfair Valley. However, the level of faulting is no more pronounced in this region than in other portions of the Great Basin. Most of the mapped faults are confined to the uplands where bedrock is exposed. Undoubtedly, faults also underlie the basin areas but are nondetectable because of the alluvial cover.

2. For purposes of this study, faults that have not ruptured within the last two million years do not present a seismic hazard. Those faults that have moved within the last two million years are considered potentially active and have very long return periods of displacement or are now



(LOOKING NORTH)

EXPLANATIONS

- APPARENT UPLIFT OF RANGE HAS OCCURRED ALONG THE LANFAIR RANGE BOUNDING FAULT, RESULTING IN TILTING (DOWN TO THE EAST). SUBSEQUENT GRAVITY-TENSIONAL DOWNDROPPING OF BLOCKS TOWARD THE WEST AND WEST OF PIUTE SPRINGS FAULT (LATE MIOCENE TO PLIOCENE).
- UPLIFT OF PIUTE RANGE AND SUBSEQUENT NORMAL FAULTING CAUSED CLOSURE OF LANFAIR VALLEY ON EAST SIDE, ALLOWING LAKE AND INTERBEDDED VOLCANICS (QUATERNARY) DEPOSITS TO ACCUMULATE.
- WATER GAP WAS FORMED (PIUTE SPRINGS CANYON) BY CONTINUED HEADWARD AND DOWNWARD EROSION FROM PIUTE VALLEY, CAUSING MINOR BEHEADING OF SOME SURFACE DRAINAGE IN LANFAIR VALLEY.
- THE INTERBEDDED VOLCANICS/LAKE DEPOSITS ARE ASSUMED TO BE QUATERNARY AGE. NO SALINE DEPOSITS HAVE BEEN REPORTED. QUATERNARY SECTION ESTIMATED TO BE AT LEAST 1000 FEET THICK.

LEGEND

———	MAPPED FAULT
— — —	INFERRED FAULT LOCATION
N. 45° W 50° NE	STRIKE AND DIP OF FAULT OR STRATUM

0 1000 2000 FEET
HORIZONTAL SCALE

0 500 1000 FEET
VERTICAL SCALE

FIGURE 4.2.4

CONCEPTUAL GEOLOGIC CROSS-SECTION THROUGH PIUTE GORGE

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SOURCE: BASED UPON GEOLOGIC FIELD MAPPING BY ENVIRONMENTAL SOLUTIONS, INC. 1988

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incapable of further movement. Faults that have ruptured in the last 10,000 years are considered active and capable of reactivation with return periods of perhaps a few hundred years.

3. No active faults have been delineated in the study region (Jennings, 1975; Longwell et al., 1965; Wesnoustry, 1986). The closest known active fault, which ruptured historically, is the Mannix Fault, 72 miles west of the project site.

4. Very few potentially active faults have been delineated in the region. The closest such mapped faults lie northwest of the Castle Mountains and include an unnamed fault (three miles long) and the State Line Fault (19 miles long). Basin bounding faults most likely exist within Lanfair and surrounding valleys, but now lie buried beneath Miocene alluvium. One such fault was observed in the deep dissected canyon at the southeastern end of the Piute Range near Piute Gorge. Pleistocene age lakebeds are juxtaposed against Miocene age volcanics along this fault at the entrance to the canyon. This is a normal fault that dips west at about 56 degrees and trends north-south along the west side of Piute Range with an estimated 12-mile length. The fault could be within three miles of the project site, but would not cross through it.

5. The central Mojave Desert faults comprise a series of major northwest trending features that display mostly right lateral displacement similar to the San Andreas Fault system. The closest of these is the Ludlow Fault, which lies at a distance of 67 miles southwest of the project site. All faults in this system are considered at least potentially active. The Garlock Fault lies 71 miles to the northwest and stretches from Gorman to Death Valley. Recent evidence indicates that portions of this fault are active. The active San Andreas Fault lies 146 miles to the southwest, along the western border of the Mojave Desert, and trends to the northwest.

6. Active and potentially active faults in the Clark County area of Nevada have not been designated. Neither the State Geologic Map by Stewart and Carlsen (1978) nor the Clark County Geologic Map (Plate 1) by Longwell et al. (1965) shows any possible Quaternary faults within a 50-mile distance of the site.

7. Several local faults have been mapped within the Castle Mountain area (Joseph, 1985). Most of these appear as normal faults and trend to the northeast, parallel to the mountains. These features are confined to Miocene age deposits and, if projected, would be buried beneath Quaternary alluvium in the Valley.

8. Major named faults within the adjacent ranges and basins, such as the Ivanpah and Clark Mountain Faults (Joseph, 1985), are considered inactive, having last ruptured prior to Quaternary time.

4.2.4 SEISMICITY

1. Within an approximate 50-mile radius of the proposed Castle Mountain Project site, no earthquake above magnitude 4.0 has been recorded since 1900 (Real, et al., 1978). Even the oldest catalog for earthquakes, which dates back to 1769, does not report any evidence of detectable earthquake events in the eastern Mojave Desert region or southern Nevada in proximity to the study area.

2. The largest historic earthquake to occur in the region was the April 10, 1947, magnitude 6.2 event on the Mannix Fault, 72 miles to the west. Ground rupture was reported, and the shaking was detectable over a 75,000-square mile region, with a maximum Modified Mercalli Intensity of VII (see Table 4.2.1, Modified Mercalli Scale, 1956 Version).

3. Historically, Lanfair Valley lies in a zone of very low seismic activity, typical of most of the eastern Mojave Desert region and southwestern Clark County. Most of the present seismicity in southern California exists along known active faults, such as the San Andreas system and, to a lesser degree, on the central Mojave Desert fault system. A considerable amount of reservoir-induced low to moderate seismicity has occurred near Hoover Dam and Lake Mead 50 miles to the northeast.

4. The seismic risk map of the U. S. (Algermissen; U.S. Geological Survey, 1969) shows the study region to lie within Seismic Zone 2, which can experience moderate damage corresponding to Intensity VII of the Modified Mercalli Intensity Scale (Table 4.2.1). Zoning also shows that there is a constant 90 percent probability that horizontal acceleration of 0.04g will not be exceeded in the next 50 years (Algermissen and Perkins, 1982).

TABLE 4.2.1

MODIFIED MERCALLI SCALE, 1956 VERSION*

Intensity		Effects	v,†	g‡
M§	I.	Not felt. Marginal and long-period effects of large earthquakes (for details see text).		
3	II.	Felt by persons at rest, on upper floors, or favorably placed.		
	III.	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.		0.0035-0.007
4	IV.	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV wooden walls and frame creak.		0.007-0.015
	V.	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.	1-3	0.015-0.035
5	VI.	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle—CFR).	3-7	0.035-0.07
6	VII.	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments—CFR). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.	7-20	0.07-0.15
	VIII.	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.	20-60	0.15-0.35
7	IX.	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations—CFR.) Frame structures, if not bolted, shifted off foundations. Frames cracked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.	60-200	0.35-0.7
8	X.	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.	200-500	0.7-1.2
	XI.	Rails bent greatly. Underground pipelines completely out of service.	>500	>1.2
	XII.	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.		

NOTE: Masonry A, B, C, D. To avoid ambiguity of language, the quality of masonry, brick or otherwise, is specified by the following lettering (which has no connection with the conventional Class A, B, C construction).

- Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.
- Masonry B: Good workmanship and mortar; reinforced, but not designed to resist lateral forces.
- Masonry C: Ordinary workmanship and mortar; no extreme weaknesses such as non-tied-in corners, but masonry is neither reinforced nor designed against horizontal forces.
- Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

*From Richter (1958).[1] Adapted with permission of W. H. Freeman and Company.

†Average peak ground velocity, cm/s.

‡Average peak acceleration (away from source).

§Magnitude correlation.

CFR - C.F. Richter

REFERENCE: HUNT GEOTECHNICAL ENGINEERING INVESTIGATION MANUAL, REV. ED., 1984

4.2.5 MINERAL RESOURCES

1. Gold deposits in the Castle Mountains are found in mineralized zones within late Tertiary rhyolite flows, tuffs, and breccias which have been extruded through the Precambrian basement rock. Mineralization is thought to have occurred by hydrothermal fluids related to the late stages of volcanic activity. The hydrothermal solutions deposit the gold and silver ions in the first stages of magmatic crystallization along existing cracks and fractures. The main mineralized area is ringed by the rim of a small caldera about five miles in diameter, as evidenced by a series of arcuate silicified fractures located along the rim of the caldera.

2. In the mineralized zone, gold is the major metal, as the silver content is low, and base metals are nonexistent. Most mineralization is very fine-grained, although coarse gold has been encountered in some areas. The gold is associated with zones of higher permeability, as it occurs in well-fractured or brecciated rock units, i.e., mainly within small quartz veins and fractures or in silicified breccias.

3. The Castle Mountain Project known ore reserves are found in orebodies identified as the Lesley Ann/Jumbo and Oro Belle deposits. Silicified zones, associated with higher gold grades, are found to outcrop at the Oro Belle deposit. Near surface, coarse gold found in veins was mined in the early 1900s. The mining was short-lived, however, as the veins diminished with depth. Some coarse gold can still be found in shallow underground workings of the Oro Belle deposit, and minor visible gold is found in drill cuttings and core. The three deposits are expected to contain at least 30 million tons of mineable ore.

4.2.6 PALEONTOLOGICAL RESOURCES

4.2.6.1 Woodrat Middens

1. Woodrats (*Neotoma spp.*) occur throughout the arid and semi-arid regions of the southwestern United States. These animals characteristically build large nests in which they accumulate food, objects, and fecal material. Fossil nests, known as middens, have been found in dry, protected rocky shelters where middens were built and preserved. Paleontologists have analyzed these fossil middens for plant materials to evaluate vegetational changes and inferred climates during the past 22,000 years (Van Devender and Spaulding, 1979).

2. The presence of woodrat nests on the project site was noted by Gould (1987a) in fallen Joshua trees. Nests in such locations would not be expected to be old enough to provide information of paleontological importance. However, middens could occur in protected locations among rocks in the Castle Mountains.

4.2.6.2 Clay Deposits

1. Clay deposits, often formed as sediments, are laid by wind and water deposition. The clays may inhibit decomposition of organic materials (fossils) which can be deposited concurrently. Such clay deposits, therefore, are often of paleontological interest.

2. The clay deposits in the immediate vicinity of the Castle Mountain Project are, by contrast, volcanically derived and were formed as a result of hydrothermal alteration of igneous rocks. Since the deposits are of igneous origin (as opposed to sedimentary beds), fossils would not be expected.

4.3 WATER RESOURCES

1. This section describes the existing hydrogeologic environment of the following four areas:

   - The 340-square mile Lanfair Valley (Figure 4.3.1, Lanfair Valley Surface Water Drainage).
   - The proposed Castle Mountain Project area, located in the northeastern portion of Lanfair Valley.
   - The proposed well field for the project, located in the northern portion of Lanfair Valley.
   - The Piute Spring area, located on the east flank of the Piute Range, adjacent to the southeast corner of Lanfair Valley.

   Piute Spring is considered to be important because it is the only source of continuous surface water flow within the region. Although the spring is more than 15 miles from the proposed well field, concern has been expressed that the spring potentially could be affected by the pumping of water from the Lanfair Valley basin.

2. Existing water resources are discussed in the following three sections:

   - Section 4.3.1 - Climate
   - Section 4.3.2 - Surface Water
   - Section 4.3.3 - Ground Water

   The potential impact of the proposed Castle Mountain Project on the water resources is addressed in Section 5.3.

3. The data and analysis presented have been summarized from a separate, detailed Lanfair Valley hydrogeologic study prepared by Environmental Solutions, Inc. (1988) that is incorporated by reference. Definitions of terms used in this section and in the study are provided in Chapter 10.0, Terms and Abbreviations.

4.3.1 CLIMATE

1. The climate of Lanfair Valley is arid to semi-arid, with low annual precipitation and generally warm temperatures. Representative area temperature extremes at Searchlight, 16 miles northeast of the proposed project site in Piute Valley, ranged from 8 to 109 degrees Fahrenheit for the period from 1951 to 1980, with an average annual temperature of 63 degrees Fahrenheit

(Ruffner, 1985). Winter temperatures in Lanfair Valley are assumed to be somewhat lower than at Searchlight, due to the Valley's higher elevations. Summer temperatures at similar elevations, especially in the lower regions of Lanfair Valley, are anticipated to be comparable to those at Searchlight. Large daily temperature fluctuations are common.

2. Precipitation in Lanfair Valley is expected to range between about six inches at the lower elevations to over 11 inches at the mountain peaks. Rush and Huxel (1966) published a graph correlating precipitation to elevation for the adjacent Piute Valley, and French (1988, in progress) has developed a similar relationship for the Nevada nuclear test site, located about 200 miles northeast of Lanfair Valley. Both graphs are shown in Figure 4.3.2, Relationship of Precipitation to Elevation. The curves are similar and are considered to be appropriate for estimating annual precipitation in Lanfair Valley. The curves indicate the following relationship between elevation and rainfall:

Elevation in Feet	Estimated Average Annual Precipitation in Inches
3,000	6
4,000	7
5,000	9
6,000	11

4.3.2 SURFACE WATER

1. Lanfair Valley consists of a semi-enclosed, 340-square mile surface water drainage area, illustrated in Figure 4.3.1. The Valley is surrounded by mountains or areas of high bedrock, except for several water gaps described below. The Valley floor is elevated relative to the adjacent Piute, Ivanpah, and Fenner Valleys, apparently the result of alluvial backfilling within the surrounding areas of high bedrock.

2. The maximum basin dimensions are approximately 20 miles (east to west) and 17 miles (north to south). Elevations on the basin floor (alluvial material) range from 3,200 feet at the southeastern extreme to over 5,000 feet at the northern limits adjacent to the New York Mountains. Topographic relief on the basin floor is relatively low, with gradients varying from approximately 50 to 200 feet per mile.

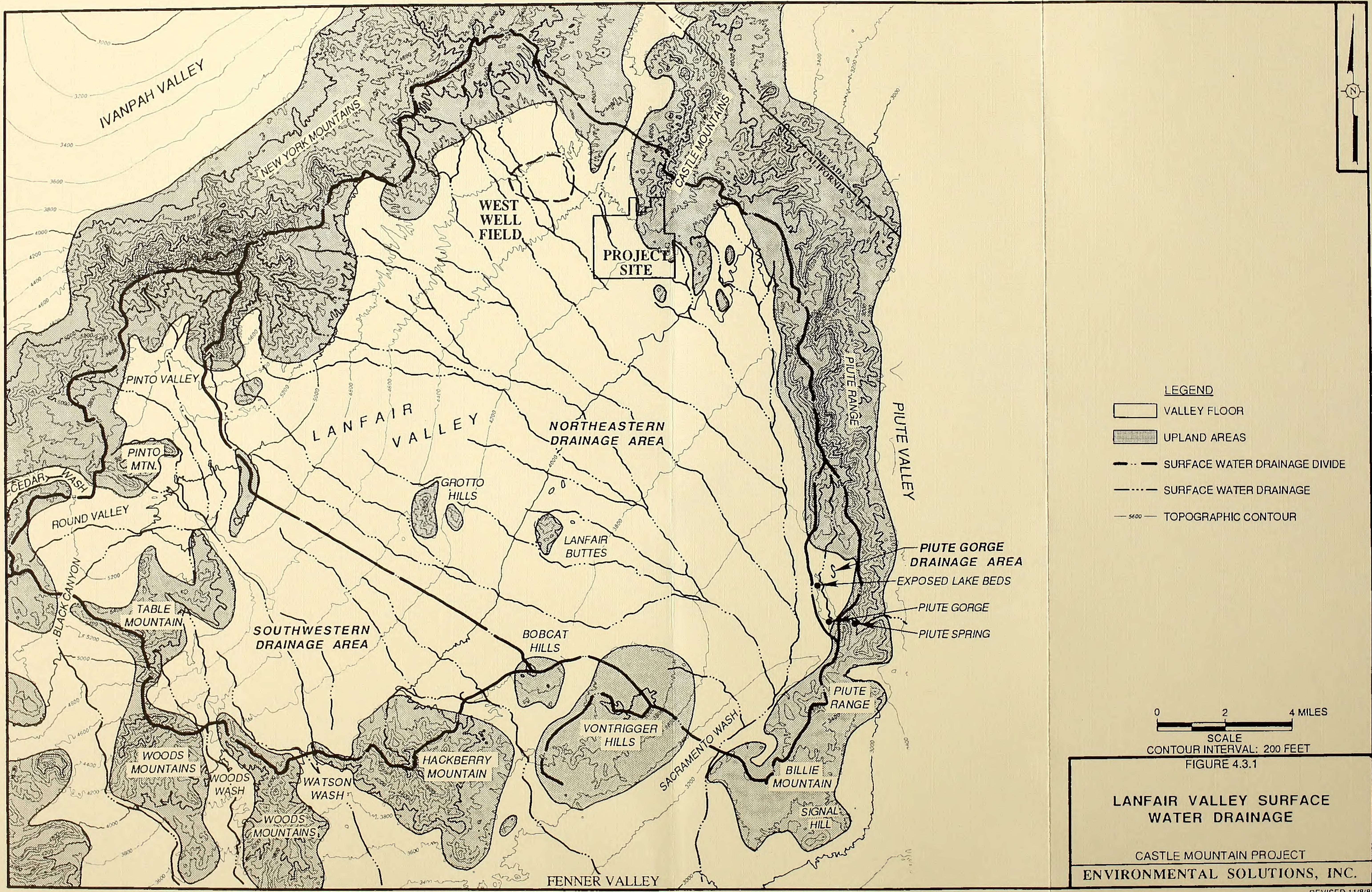

FIGURE 4.3.1

LANFAIR VALLEY SURFACE WATER DRAINAGE

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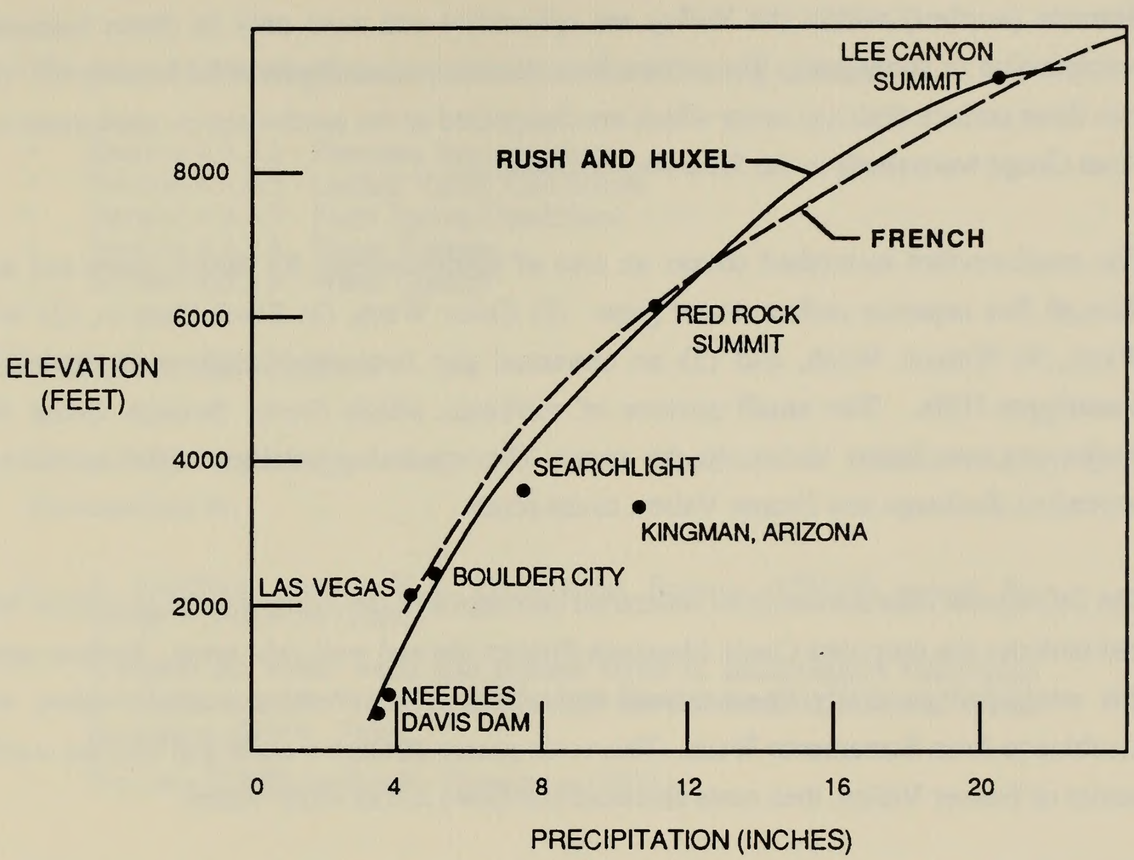

RELATIONSHIP OF ELEVATION TO
AVERAGE ANNUAL PRECIPITATION

SOURCE: RUSH AND HUXEL, 1966
FRENCH, IN PROGRESS

FIGURE 4.3.2

RELATIONSHIP OF PRECIPITATION TO ELEVATION

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3. The mountain slopes lying above the alluvial floor represent approximately 80 square miles, or about 24 percent, of the total watershed. These slopes vary in elevation from about 3,300 feet at the southern end of the Piute Range to about 7,300 feet in the New York Mountains.

4. Streams (washes) within the Valley are ephemeral and flow only in direct response to precipitation or snow melt. The stream flow directions (see Figure 4.3.1) divide the Valley into three surface drainage areas which are designated as the southwestern, northeastern, and Piute Gorge watersheds in the following discussions.

5. The southwestern watershed covers an area of approximately 95 square miles and drains through five separate surface water gaps: (1) Cedar Wash, (2) Black Canyon, (3) Woods Wash, (4) Watson Wash, and (5) an unnamed gap between Hackberry Mountain and Vontrigger Hills. The small portion of subbasin which drains through Cedar Wash discharges into Kelso Valley, to the west. The remaining portions of the southwestern watershed discharge into Fenner Valley, to the south.

6. The 240-square mile northeastern watershed encompasses the major portion of Lanfair Valley and includes the proposed Castle Mountain Project site and well field areas. Surface water in this watershed generally flows toward the southeast in several unnamed washes, which combine to form Sacramento Wash. This wash passes through a water gap into the northeast corner of Fenner Valley, then turns eastward and flows across Piute Valley.

7. The Piute Gorge watershed is only about five square miles in size. This relatively small area discharges into a deeply incised (1.5- by 0.5-mile) gorge eroded into the alluvium, which then drains into a bedrock canyon through the Piute Range toward Piute Spring.

4.3.3 GROUND WATER

1. Most of the water required for the project would be obtained from wells into alluvium at the proposed West Well Field, described in Section 3.2.5.1, Water Requirements and Supply. A minor amount of water may also be obtained from wells within the project area, designated by the Applicant as the East Well Field.

2. The main emphasis of the following discussion is to describe the Lanfair Valley hydrogeologic conditions as they are related to the proposed ground water extraction wells in the West Well Field and to establish the apparent relationships between conditions in the Valley and Piute

Spring. Conditions at the site are discussed in less detail because ground water there is generally greater than 400 feet from the surface, and project activities would not affect hydrogeologic conditions (Mark Group, 1987, 1988; Mifflin & Associates, Inc., 1987; Viceroy Gold Corporation, 1988a, b).

3. The ground water discussion is presented in the following sections:

- Section 4.3.3.1 - Previous Investigations
- Section 4.3.3.2 - Lanfair Valley Conditions
- Section 4.3.3.3 - Piute Spring Conditions
- Section 4.3.3.4 - Water Balance
- Section 4.3.3.5 - Water Quality

4.3.3.1 Previous Investigations

1. General hydrogeology and ground water resources of Lanfair Valley have been characterized in:

   - A relatively recent U.S. Geological Survey (USGS) report by David A. Friewald (1984).
   - A report for water wells and ground water in southeastern California (including Lanfair Valley), published by the California Division of Water Resources (DWR, 1956).
   - Previous USGS studies by Thompson (1921).

2. More recent investigations conducted specifically for the proposed Castle Mountain Project (Mark Group, 1987, 1988; Mifflin and Associates, 1987) have greatly increased the available data base, especially for the northeastern portion of the basin and at Piute Spring.

3. The amount of recharge (precipitation infiltration) into Lanfair Valley is an important parameter for evaluating potential impacts which are discussed in Section 5.3. Data for estimating recharge is also presented by the Mark Group (1988). These estimates rely upon procedures developed and used for Nevada and California Desert valleys by the USGS.

4. A more detailed discussion of hydrogeologic conditions in Lanfair Valley is provided in a report prepared by Environmental Solutions, Inc. (1988) in support of this EIS/EIR document, Evaluation of Potential Effects on Lanfair Valley Aquifer and Piute Spring, Castle Mountain Project. That report includes a list of related references that have been consulted.

4.3.3.2 Lanfair Valley Conditions

Aquifer Characteristics

1. Unconsolidated alluvial and colluvial soils represent the primary source of potential ground water in Lanfair Valley. The rock surrounding and underlying the Valley may be suitable for small domestic wells, but not for the relatively high yields required for a mining operation. Aquifer test data provided by the Mark Group indicates that the transmissivity (measure of the ability of a material to transmit water) of the unconsolidated material is at least one order of magnitude higher than the rock.

2. Figure 4.3.3, Consolidated and Unconsolidated Rock within Lanfair Valley, illustrates the limits of the unconsolidated materials and the locations where consolidated rock is exposed. In general, the rock is located around the perimeter of the basin except at the several surface water gaps discussed in Section 4.3.2. The potential for a zone of high rock to exist in the north-south direction across Lanfair Valley between the Castle Mountains and Bobcat Hills is addressed in Section 4.2, Geology. The degree to which the individual outcrops along this trend are connected in the subsurface is not known. If the high rock condition is continuous for most of the distance, it would function as a physical barrier between Piute Spring and the area of proposed pumping for the project. The well field would be essentially separated from conditions at Piute Spring. In order to be conservative in evaluating the potential relationship of pumping to Piute Spring, it is assumed that a significant amount of unconsolidated material occurs in this area in order to portray hydraulic continuity across the possible bedrock high.

3. Data available to describe hydrogeologic conditions in Lanfair Valley is derived primarily from springs in the area and from wells which have been drilled and reported in the Valley (see Figure 4.3.4, Location of Well and Spring Data Points). Available data for these wells and springs is provided in summary tables in Environmental Solutions, Inc. (1988). Piute Spring is the only perennial flowing stream in the area. Other springs are located in the high bedrock surrounding Lanfair Valley and generally have small, intermittent flows during wet periods. These springs provide little useful data for evaluating subsurface conditions for the unconsolidated valley fill material.

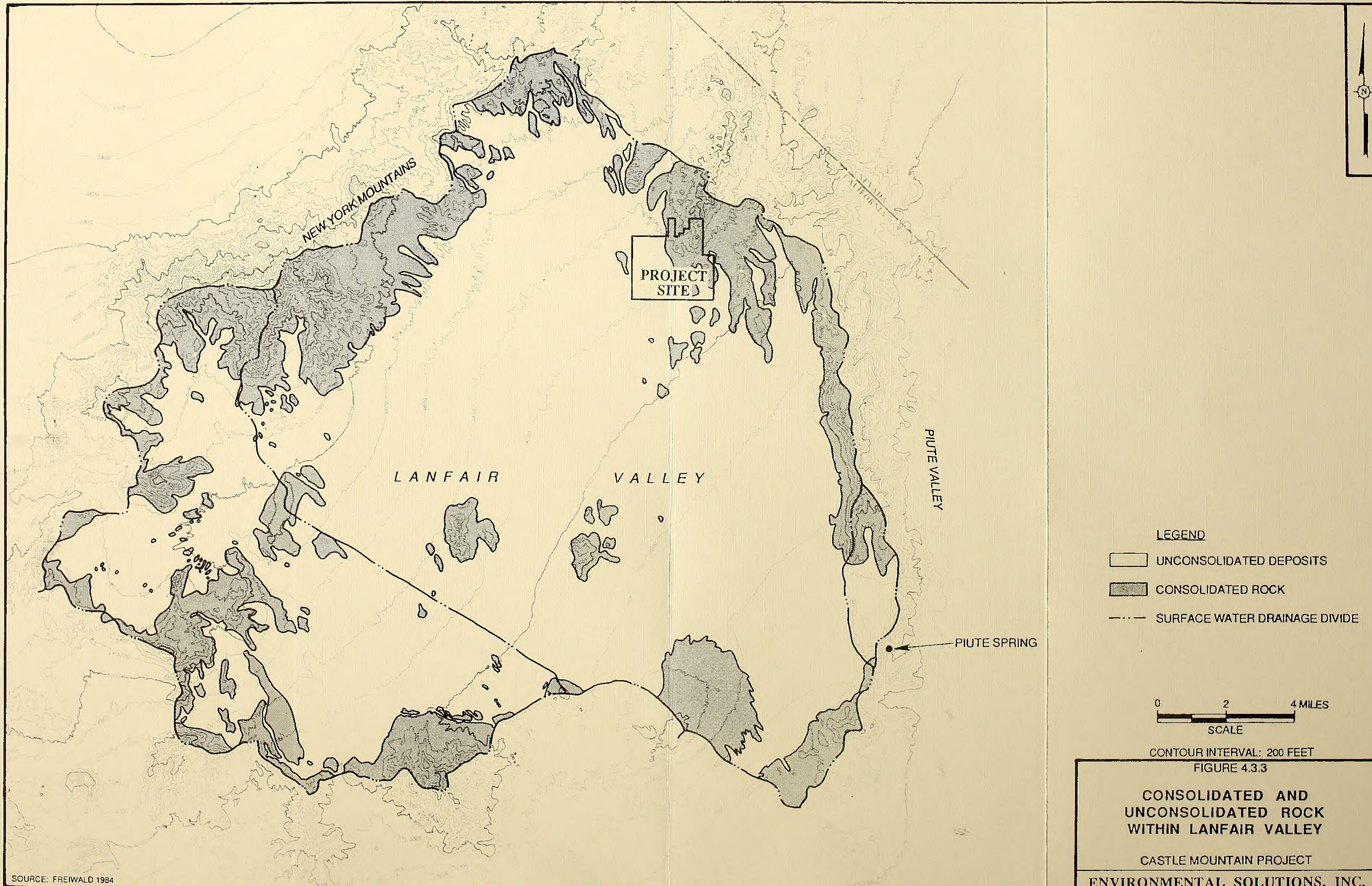

FIGURE 4.3.3

CONSOLIDATED AND UNCONSOLIDATED ROCK WITHIN LANFAIR VALLEY

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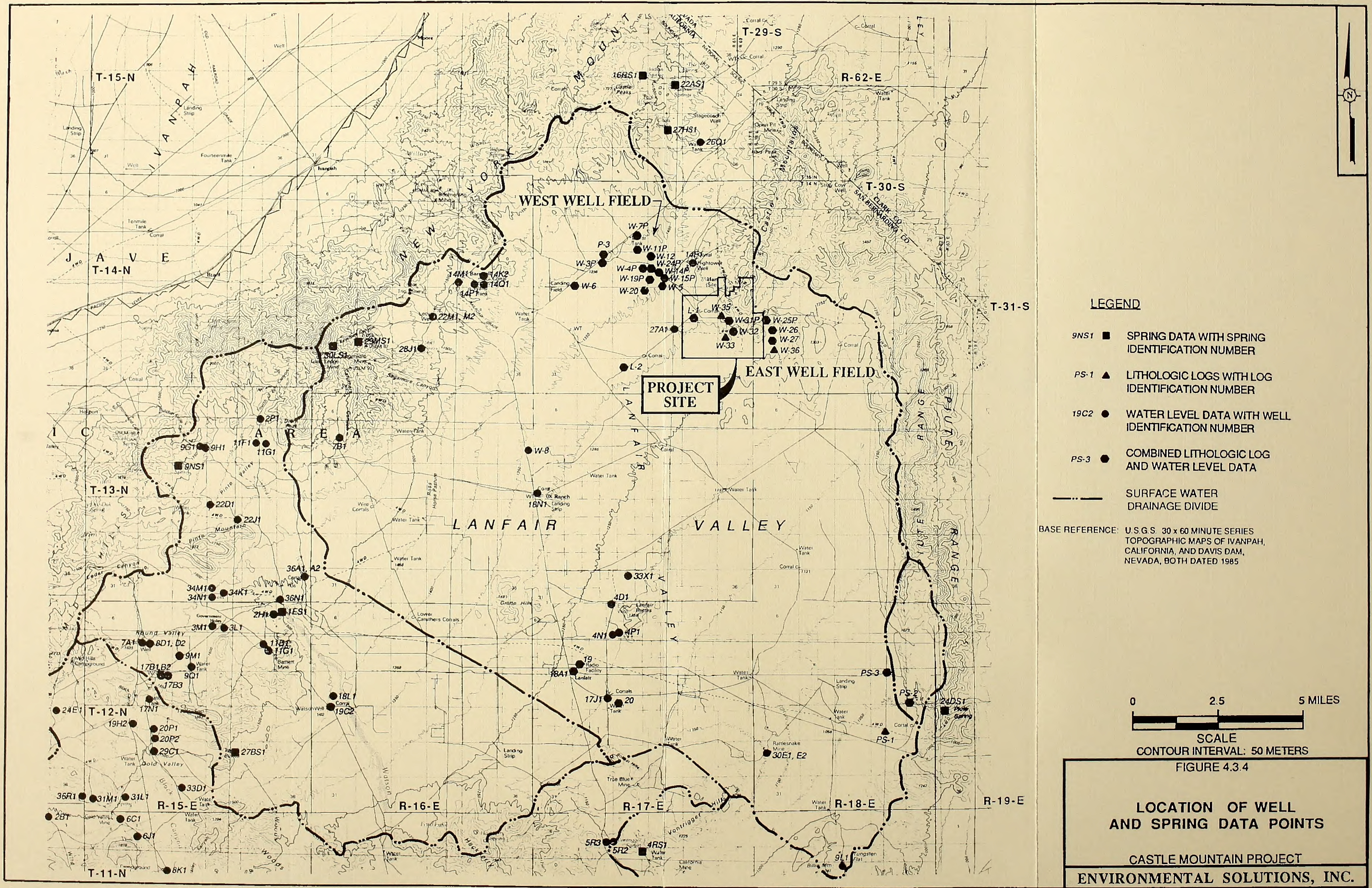

FIGURE 4.3.4

LOCATION OF WELL AND SPRING DATA POINTS

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4. The greatest amount of data for describing the unconsolidated material is associated with historical well records (Friewald, 1984 and Thompson, 1921) and, especially, by the extensive drilling by the Mark Group in the proposed West Well Field and by the Applicant in the project site area. Significant data is also available in the vicinity of Piute Gorge in the form of: (1) large exposures to a depth of 200 feet where the gorge is incised into the valley bottom, and (2) data from three wells drilled adjacent to the gorge by the Mark Group.

5. Conditions across the Valley, as interpreted from the available data, are illustrated in Figure 4.3.5, Lanfair Valley Hydrogeologic Cross-Section. Specific conditions of the northern and southern ends of this cross-section are discussed in Section 4.2, Geology, and in the following paragraphs.

6. The unconsolidated valley fill in the vicinity of the West Well Field is characterized as follows:

   - The valley fill materials vary from gravel to clay and at some locations are interbedded with volcanics (volcanic rock) extending to depths of 1,125 feet.
   - Hydrogeologic properties of the valley fill materials vary vertically and horizontally because of the variability of material types and the existence of volcanics.
   - The overall saturated thickness in the well field is greater than 700 feet, although the effective thickness from a water availability viewpoint may be somewhat less, because the interbedded volcanic zones have much lower transmissivity than the sands and gravels.
   - A persistent confining layer in the alluvium is not evident from the well log data or the interpretation of geologic conditions in the Valley. However, short-term aquifer test results indicate that the aquifer initially behaves as a confined system when pumping is started. The Mark Group (1988) interprets this condition to be a result of the interbedded nature of the materials and concludes that under actual well field conditions, the aquifer would function as an unconfined system.

7. Thickness of unconsolidated sediments is judged to increase toward the southeast, away from the Castle Mountains. Exposures at Piute Gorge indicate that a thick sequence of lacustrine (lake) deposits, with interbedded volcanic flows, exist within the alluvium in the southeast portion of Lanfair Valley. Depending on extent and thickness, these fine-grained deposits also could represent a physical barrier between the proposed West Well Field and the Piute Spring area. Again, to be conservative, potential impacts of project-related

ground water removal on Piute Spring (Section 5.3) are based on the assumption that conditions similar to those in the well field are continuous throughout the Valley and that the lacustrine deposits do not represent a physical barrier.

8. Aquifer test data for wells in the proposed West Well Field and at the proposed site indicates that appropriate hydraulic parameters for existing hydrogeologic conditions are:

Unit	Hydraulic Conductivity	Porosity
Unconsolidated Sediments	1.4×10^{-3} to 9.1×10^{-4} cm/sec	0.2 to 0.05
Volcanic Rock	3.9×10^{-4} to 4.5×10^{-5} cm/sec	Less than 0.001

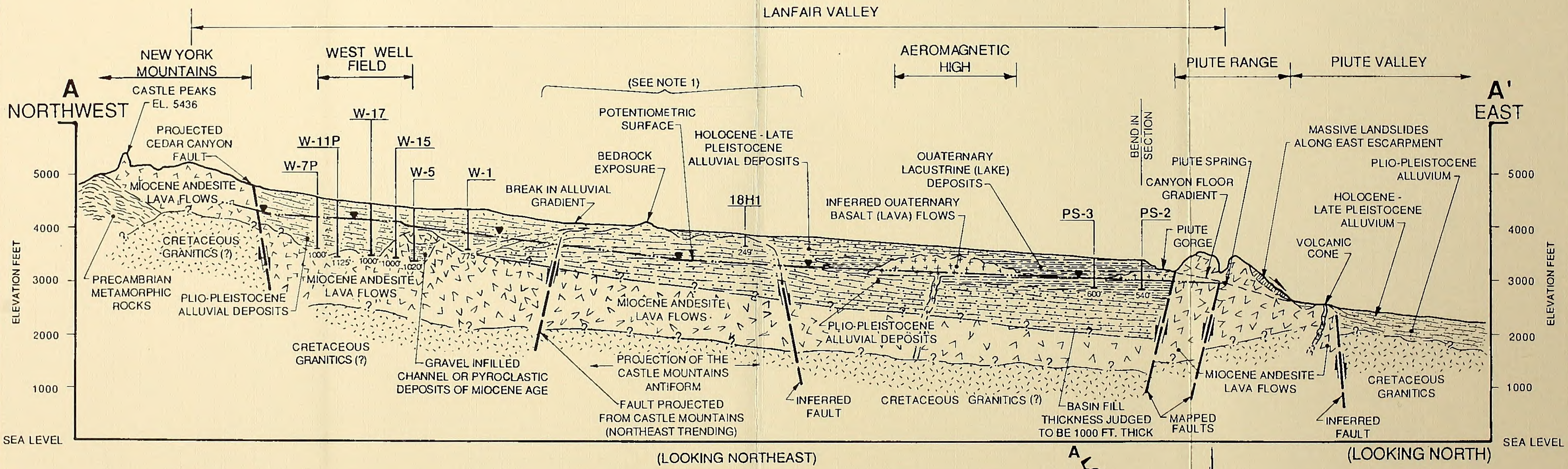
Ground Water Depth, Flow Direction, and Discharge From the Valley

1. Figure 4.3.6, Estimated Potentiometric Surface Map, illustrates the ground water elevation contours (potentiometric surface) and ground water flow directions estimated from well and spring data, topographic and geologic conditions in Lanfair Valley, and survey data for Piute Spring. The potentiometric surface slope is highest near the mountains and becomes more gradual toward the southeast, coinciding with the general topographic expression. Also, the depth to water is shallowest in the western (recharge) portion of the basin, becoming deeper toward the east.

2. The general ground water flow direction for most of the Lanfair Valley basin area is toward the east-southeast, although flow from the southwest portion of the basin is toward the south. Deviations occur in localized areas due to changes in topography or the presence of shallow rock.

3. The relationship between water level contours in the Lanfair and Piute Valleys is estimated to reflect the several hundred feet elevation change (gradient) between the Lanfair and Piute basins. The amount of flow between the basins is dependent on this gradient and the hydraulic conductivity of the volcanic rock which forms the Piute Range. This gradient data indicates ground water discharges from the Lanfair Valley basin at the following locations:

   - Ground water flow in approximately the southwestern 25 percent of the study area appears to flow toward the south-southeast into Fenner Valley. This portion of the basin is of limited interest for evaluating the remainder of the basin because neither recharge nor discharge from this area would have an effect on either the West Well Field or Piute Spring.



SECTION A-A'

LEGEND

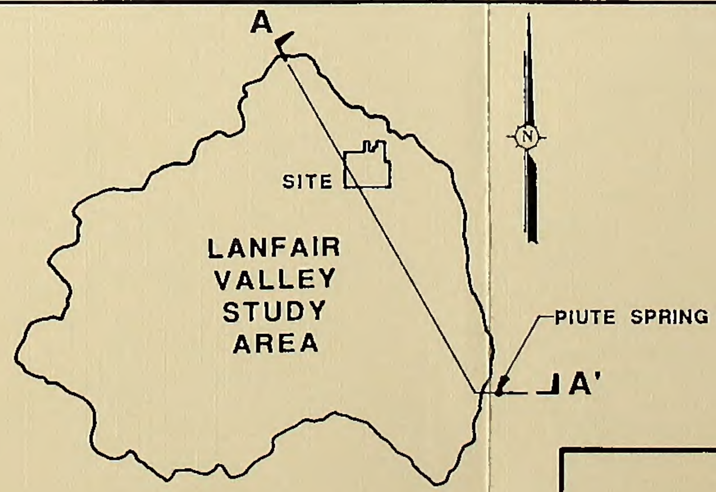
——···——	POTENTIOMETRIC SURFACE
——?——	INFERRED GEOLOGIC CONTACTS
	FAULT SHOWING RELATIVE MOVEMENT
W-11P 1000'	WELL DESIGNATION AND WELL DEPTH

(NOTE: ALL WELLS LOCATED WITHIN 3000 FEET OF CROSS-SECTION WERE PROJECTED AND SHOWN ON THE SECTION.)

0 2000 4000 FEET
VERTICAL SCALE

0 2 4 MILES
HORIZONTAL SCALE

APPROXIMATE VERTICAL EXAGGERATION: 5:1



CROSS-SECTION LOCATION

NOTE 1: THE POSSIBLE SHALLOW BEDROCK ZONE IN THIS AREA, WHICH WOULD TEND TO ISOLATE THE WEST WELL FIELD FROM THE PIUTE SPRING, IS INTENTIONALLY NOT SHOWN. THE ASSUMPTION OF CONTINUOUS ALLUVIUM THROUGHOUT THE VALLEY IS CONSERVATIVE FOR ESTIMATING POTENTIAL IMPACTS OF THE PUMPING.

FIGURE 4.3.5

LANFAIR VALLEY HYDROGEOLOGIC CROSS-SECTION

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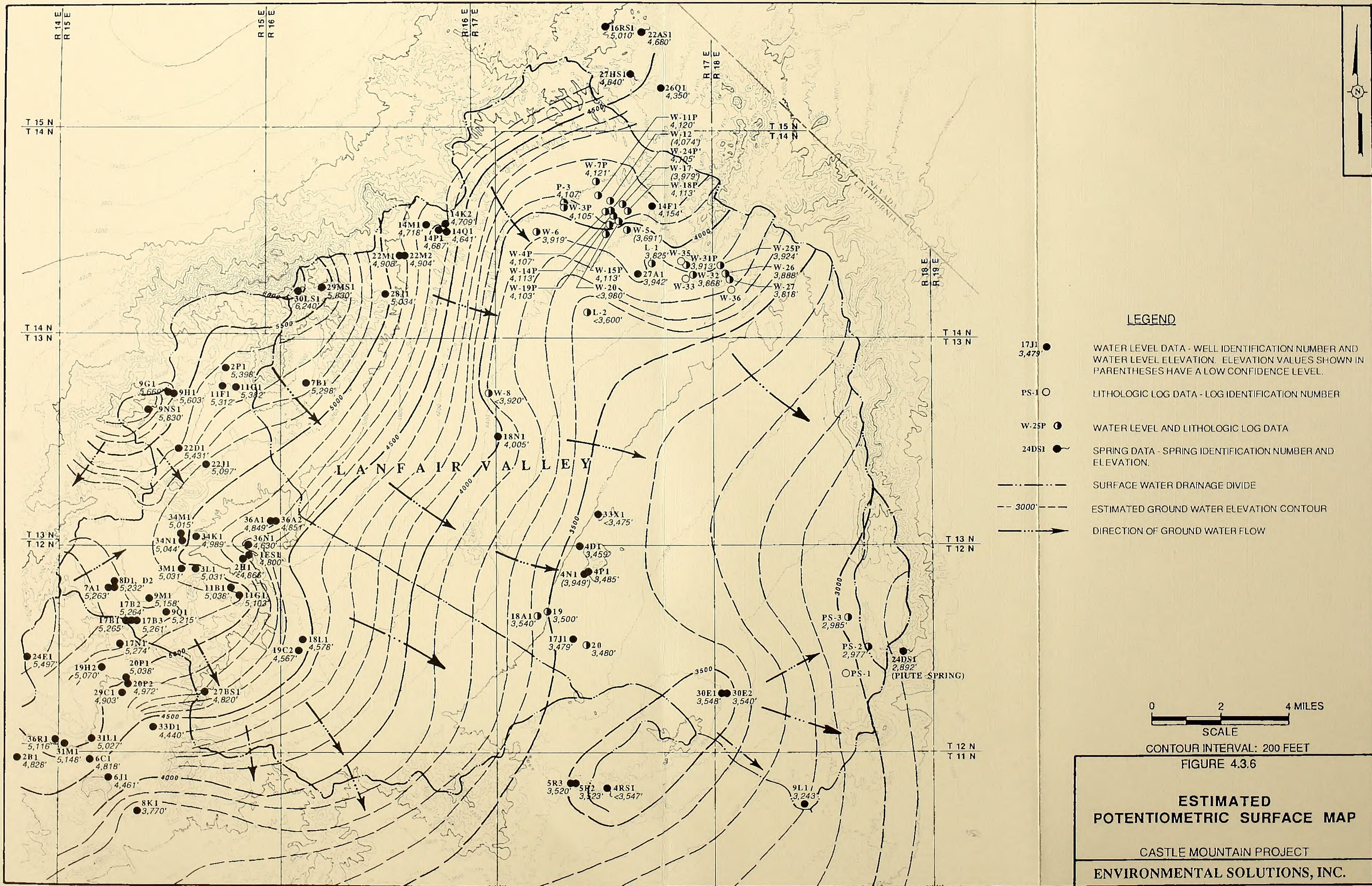

FIGURE 4.3.6

ESTIMATED POTENTIOMETRIC SURFACE MAP

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- Flow occurs toward the east for the entire length of the Piute Range as a result of the estimated 100 to 550 feet of elevation difference (gradient) between the water level in Lanfair Valley and the topography in Piute Valley. The ground water surface configuration in Piute Valley is expected to generally follow the surface topography.
- At Piute Spring located near the south end of the Piute Range, where erosion of the Gorge has resulted in the lowering of natural contours so that the Piute Valley water table has been intersected at the ground surface (see Section 4.3.3.3, Piute Spring Conditions).
- A small amount of discharge also may occur into Fenner Valley through the Sacramento Wash at the southeast corner of Lanfair Valley.

Ground Water Flow Rates and Quantities

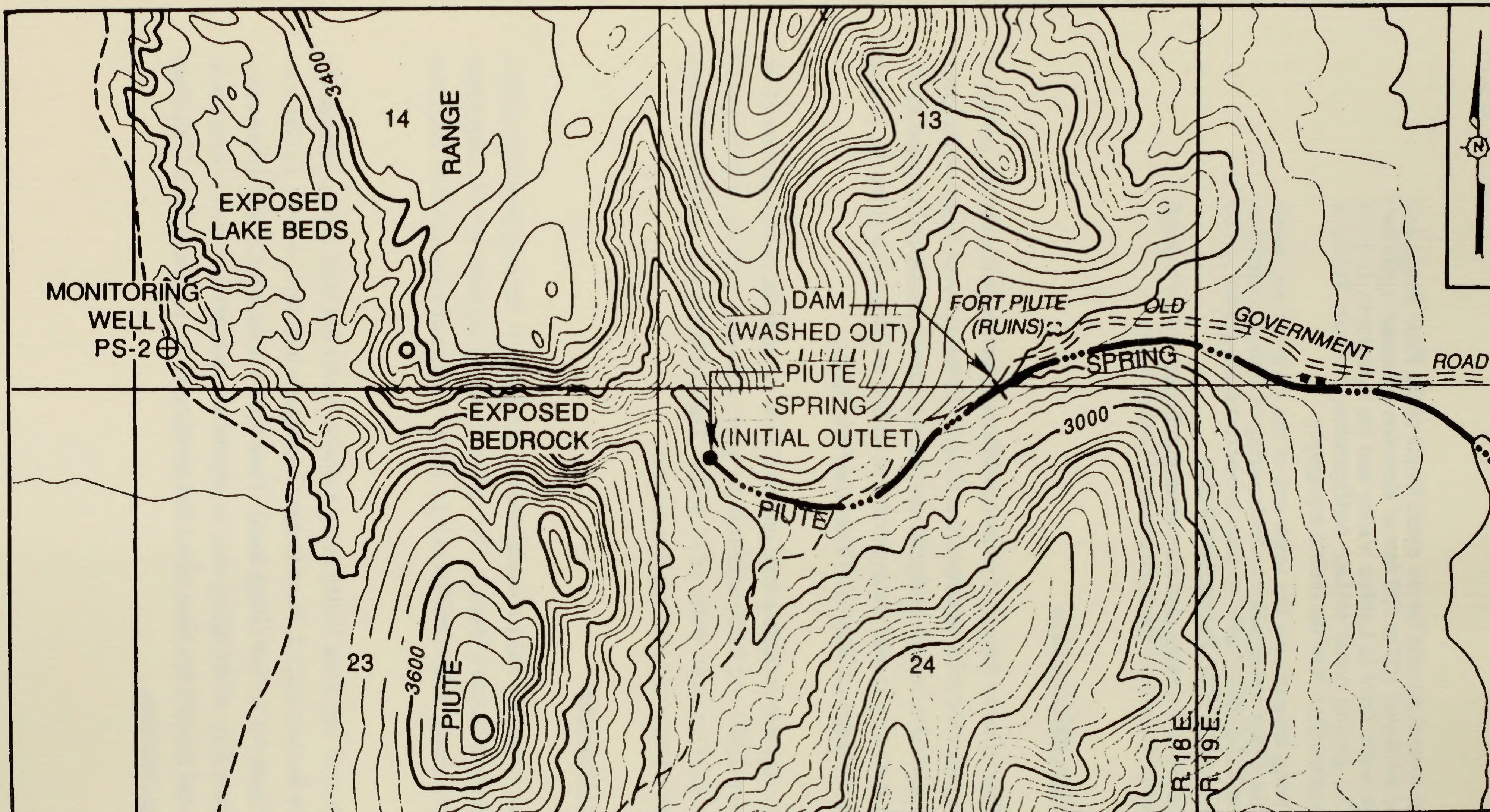
1. Ground water flow velocity through the unconsolidated deposits in the eastern portion of Lanfair Valley is estimated to be between about 60 and 140 feet per year, based on the gradients shown in Figure 4.3.6, and the hydraulic conductivities (permeabilities) discussed above. These velocities indicate a ground water travel time of 600 to 1,400 years along the 16-mile distance between the proposed West Well Field and Piute Spring.

2. These flow velocities also indicate a total potential flow through the eastern portion of the Valley of between 2,500 and 8,000 acre-feet per year, assuming a saturated thickness of 300 feet and an alluvium basin width of 11 miles. This compares with the Mark Group's (1988) basin flow estimate of 3,000 acre-feet per year.

4.3.3.3 Piute Spring Conditions

1. Piute Spring is an important water resource because it represents the only perennial surface water in the vicinity of Lanfair Valley. The spring discharge supports riparian vegetation which represents a locally unique habitat along a linear distance of about one mile into Piute Valley.

2. The spring discharges into Piute Valley along a canyon which has been eroded through the Piute Range (see Section 4.2.2.2, Piute Gorge Geology), which separates the Lanfair and Piute Valleys (Figure 4.3.7, Piute Gorge Area). Piute Spring is included in this environmental analysis because flow of the spring may be dependent upon ground water conditions in Lanfair Valley, and concern has been raised that pumping of the proposed West Well Field may affect spring conditions.



LEGEND

PERENNIAL FLOW

0 1400

SCALE

CONTOUR INTERVAL: 40 FEET

SOURCE: 15-MIN. U.S.G.S. TOPOGRAPHIC MAPS OF LANFAIR VALLEY AND HOMER MOUNTAIN QUADRANGLES, SAN BERNARDINO COUNTY, CALIFORNIA, BOTH DATED 1956

FIGURE 4.3.7

PIUTE GORGE AREA

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3. Presently only about five square miles of drainage area contribute to intermittent surface flow through the incised Piute Gorge and rock canyon. The origin of these features was apparently associated with much greater flows at earlier times when a larger portion of Lanfair Valley drained through this area. Based on geologic interpretations discussed in Section 4.2.2.2, this condition probably occurred during the period that the Piute Range was uplifted and a lake(s) was created in the lower portion of Lanfair Valley.

4. In order to determine the relationship of ground water level in Lanfair Valley and at Piute Spring, the Mark Group (1987) installed a standpipe in Well PS-2 located approximately one mile upgradient and west of the point where Piute Spring first exits. Also, an accurate survey was conducted to determine the elevation difference between ground water at PS-2 and the point of first discharge of the spring. In August 1987, the elevation of water in Well PS-2 and at the spring were determined to be 2,975.5 and 2,892.2 feet, respectively. Table 4.3.1, Piute Spring Monthly Monitoring (Mark Group), shows additional data on depth to water level at Well PS-2 since that time.

5. Flow conditions from the spring have been observed by a number of investigators near the first location of surface water emittance and just upstream from an abandoned dam, about 0.6 mile east of the point of first emittance (Figure 4.3.8, Piute Spring Area Locations of Monthly Monitoring Stations). These observed flows have been:

		Flow 25 Feet Downstream from Point of First Discharge[1]		Flow 50 Feet Upstream from Abandoned Dam	
Source of Data	Date	gpm	Acre-Feet per Year[2]	gpm	Acre-Feet per Year[2]
Friewald (1984)	4-15-80	--	--	390	630
Friewald (1984)	9-02-81	--	--	62	100
Friewald (1984)	1-28-82	--	--	173	279
The Mark Group	6-87 to 11-88	37 to 45[1]	60 to 72	21 to 135	34 to 218

[1] See Table 4.3.1 for monthly data.
[2] The rate, in acre-feet per year, is based on calculating an annual discharge based on instantaneous (gpm) observations.

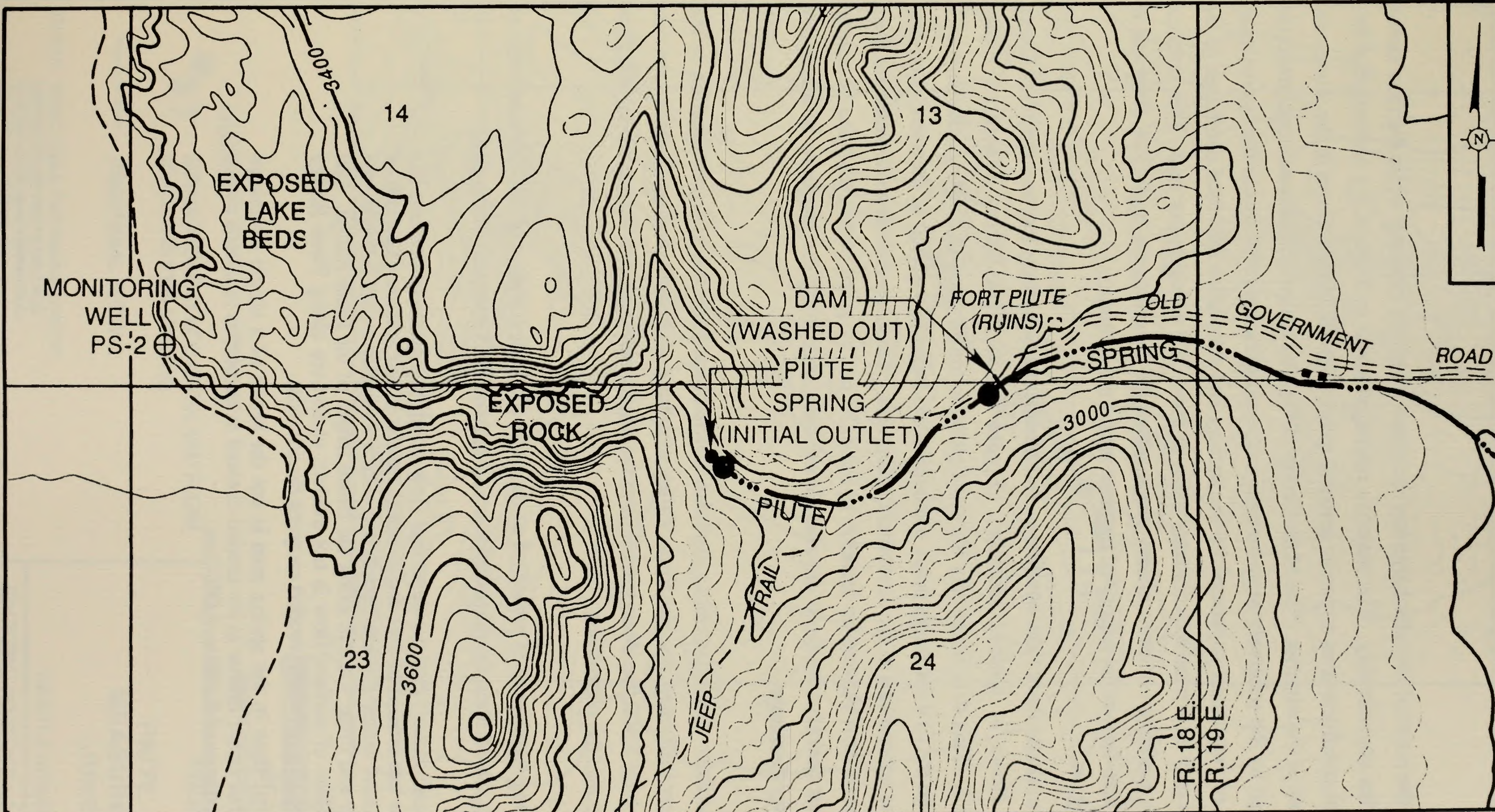
TABLE 4.3.1

PIUTE SPRING MONTHLY MONITORING (MARK GROUP)

DATE	FLOW 25 FEET BELOW SPRING OUTLET (gpm)	FLOW 50 FEET UPSTREAM OF WASHED-OUT DAM (gpm)	DEPTH TO WATER IN PS-2 IN LANFAIR VALLEY (feet)
06-20-87	41	Not Measured	Not Measured
08-26-87	37	21	431.57
09-28-87	41	37	431.14
11-01-87	45	Not Measured	431.05
11-24-87	45	90	430.79
12-29-87	45	121	430.49
01-28-88	41	121	430.44
02-29-88	45	73	430.21
03-28-88	41	84	430.16
04-29-88	37	84	430.33
05-26-88	45	37	430.33
07-01-88	41	21	434.70 (1)
07-28-88	37	37	434.39 (1)
08-24-88	41	95	433.95
09-26-88	37	135	432.67
11-04-88	45	114	432.18
11-30-88	45	84	432.15

Source: The Mark Group, 1988

(1) The larger than normal change in depth to water at PS-2 which occurred in July 1988 probably is related to the Mark Group's attempt to develop that well for conducting permeability tests. Water and drilling mud removed from the 2-inch casing was sufficient to cause a level decrease of about 15 feet. The small diameter casing made development difficult and it was decided to leave the well only for observation purposes.



LEGEND

● FLOW MONITORING

⊕ MONITORING WELL

—•••— PERENNIAL FLOW

SOURCE: 15-MIN. U.S.G.S. TOPOGRAPHIC MAPS OF LANFAIR VALLEY AND HOMER MOUNTAIN QUADRANGLES, SAN BERNARDINO COUNTY, CALIFORNIA, BOTH DATED 1956

0 1400 2800 FEET

SCALE

CONTOUR INTERVAL: 40 FEET

FIGURE 4.3.8

PIUTE SPRING AREA LOCATIONS OF MONTHLY MONITORING STATIONS

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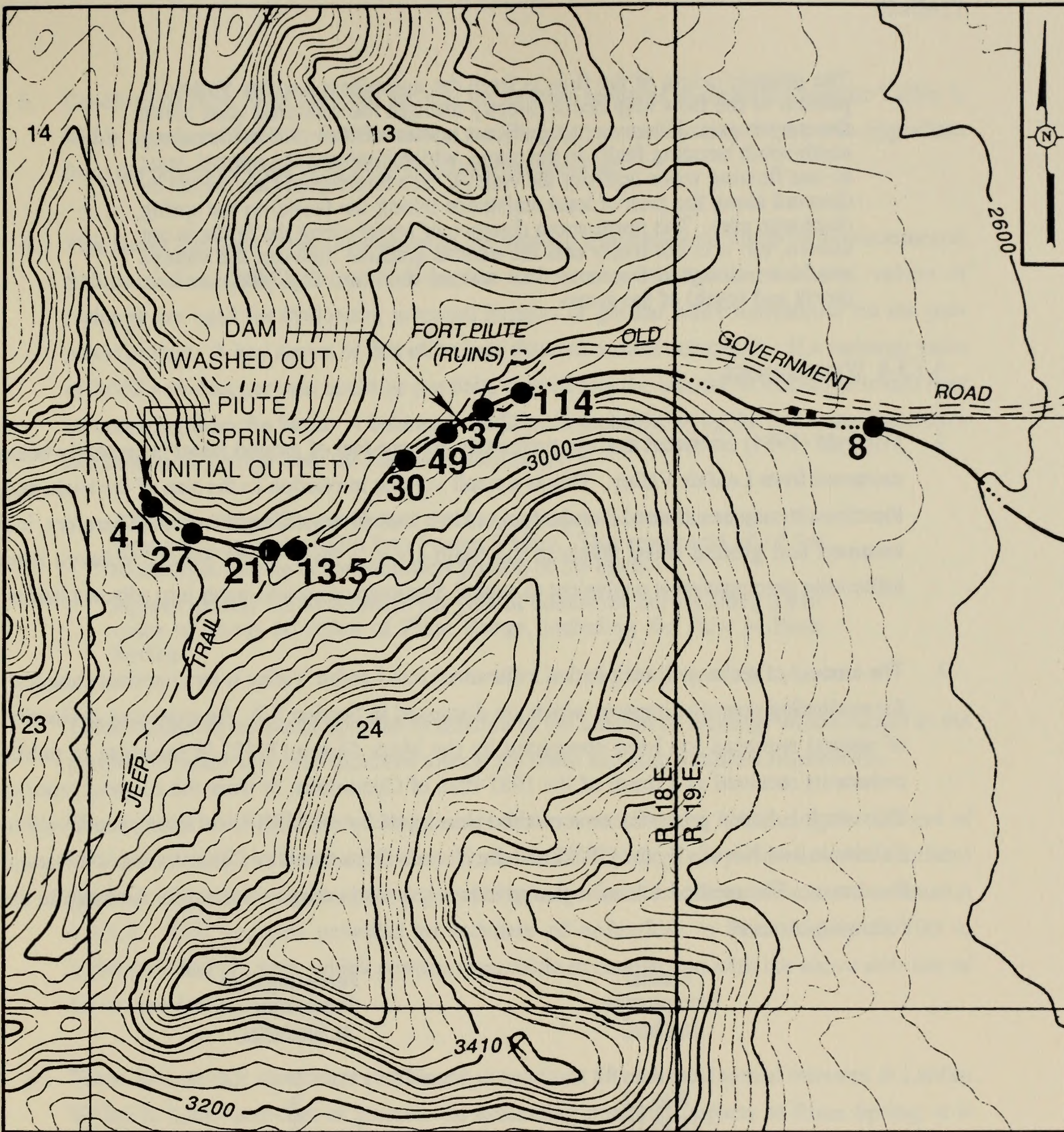
6. Flow near the point of first discharge has remained relatively constant while the flow downstream varies considerably. The monthly readings shown in Table 4.3.1 indicate that this downstream condition is an apparent seasonal trend, with the highest flows in the winter and lowest flows in the summer. The Mark Group (1988) has shown that this seasonal trend can be explained by the relatively high summer evapotranspiration rates within the approximate nine acres of vegetation supported by the spring, and concludes that total discharge in the spring area may be a relatively constant value of about 200 acre-feet per year. This estimate falls within the range of prior observations, although the relatively high flow observed in 1980 (630 acre-feet) is not supported by more recent observations.

7. To further evaluate these flow conditions, Environmental Solutions, Inc. and the Mark Group measured flows at several locations (Figure 4.3.9, Piute Spring Measured Flows (June 1988)). This data illustrates the anticipated summer trend of flows decreasing with distance from the first discharge point, although some increase occurred as the abandoned dam location was approached in the downstream direction. Measurements taken downstream from the abandoned dam showed an increase in flow (37 to 114 gpm) over a distance of several hundred feet downstream from the abandoned dam, indicating the locations of additional ground water discharge.

8. The surface flow was observed to diminish downstream from the 114 gpm location as the surface water infiltrated into the Piute Valley alluvium. A lowest reading of eight gpm was measured about 7,000 feet downstream from the abandoned dam, just before the surface flow disappeared into the subsurface.

9. The following hypothesis is presented as the most likely description of the characteristics of Piute Spring, based upon the data available and detailed field mapping of the area:

   - The basic reason that the perennial flow condition exists is because the canyon has eroded to that depth which results in the surface exposure of the ground water surface (gradient), which naturally exists between the Lanfair and Piute Valleys along the entire length of the Piute Range. The expression of surface flow is not evident elsewhere along Piute Range because similar, deep, eroded canyons do not exist.
   - The total flow in the spring area is not the result of a single discharge point, but rather inflow to the eroded channel at numerous locations over a total distance of 5,000 to 6,000 feet.



LEGEND

37 MEASUREMENT LOCATION AND FLOW (GALLONS PER MINUTE)

PERENNIAL FLOW

SOURCE: 15-MIN. U.S.G.S. TOPOGRAPHIC MAPS OF LANFAIR VALLEY AND HOMER MTN. QUADRANGLES, SAN BERNARDINO COUNTY, CALIFORNIA, BOTH DATED 1956

FIGURE 4.3.9

PIUTE SPRING MEASURED FLOWS (JUNE 1988)

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- The primary origin of the flow is from the upgradient Lanfair Valley. A portion of the flow may occur directly through the fractured zone along the canyon axis. However, a significant portion of flow also occurs along north-south trending faults in the range, which intercept the normal, west to east flowing water between the valleys. The intercepted flow would be directed along the path of least resistance (along the faults) to the spring discharge area. The north-south distance of travel along the faults is not known, but it is not likely that the natural gradient between the valleys would be disrupted for more than several thousand feet to either side (north and south) of the gorge.

4.3.3.4 Water Balance

1. Friewald (1984) estimated that approximately 30 acre-feet of ground water is presently being extracted from Lanfair Valley. This is a small volume in relation to the size of the basin and, therefore, it may be assumed that the basin is in a state of natural equilibrium. Therefore, it is assumed that ground water levels in the basin are at a level where annual recharge from infiltrating precipitation is equivalent to natural discharge of ground water into adjacent basins.

2. The amount of recharge (precipitation infiltration) into Lanfair Valley is an important parameter for evaluating potential impacts which are discussed in Section 5.3. An extensive evaluation of natural recharge has been conducted by the Mark Group (1988) in response to public comments received as a result of the 1987 Plan of Operations, or from the scoping process. This work is based primarily on a method developed by the USGS and used extensively in California and Nevada by the USGS and the Nevada Department of Conservation and Natural Resources. The method relates recharge to precipitation excess occurring in the basin in the following manner:

Annual Precipitation (inches)	Percentage of Precipitation as Recharge
Less than 8	0
8 to 12	3
12 to 15	7
15 to 20	15
Greater than 20	25

In addition, the analyses include consideration of only winter precipitation and statistical procedures for evaluating how the relationships may vary.

3. Conclusions from these analyses are that the average recharge to the entire Lanfair Valley is within a range of 2,000 to 5,000 acre-feet per year, and annual recharge in the area upgradient from the proposed West Well Field is 300 to 500 acre-feet.

4. This factor has been further evaluated in the detailed hydrogeologic study by Environmental Solutions, Inc. (1988), in order to assure that appropriate, but conservative, values of recharge are used for evaluating potential impacts of ground water withdrawal for the proposed project. A key aspect of that effort was directed toward determining if a recharge value of 2,000 acre-feet per year could be possible, considering the amount of discharge which may be occurring from the basin. A balanced condition is probable, using the following reasonable estimates of discharge from the Lanfair Valley basin:

   - Approximately 860 acre-feet of discharge per year occur from the southwest portions of the basin into Fenner Valley. This represents all of the recharge occurring in the southwest portion of the basin.
   - Approximately 1,140 acre-feet per year of underflow occurs along a distance of about 10 miles of Piute Range, including the flow at Piute Spring.

   These estimates are based upon an evaluation of the amount of recharge which occurs in the portions of basin with flow direction toward the south and east-southeast respectively.

5. The apparent validity of these estimates are further confirmed by calculating the amount of underflow which could occur between the Lanfair and Piute Valleys based on an estimated gradient across the range and the permeability range for volcanic rock discussed in Section 4.3.3.2. This analysis provides an estimate of underflow to Piute Valley of 700 to 1,400 acre-feet per year, which appears reasonable in comparison with the above estimate of 1,140 acre-feet per year.

6.. These data provide significant confidence to conclude that the total annual recharge to Lanfair Valley is 2,000 acre-feet or greater. In evaluating potential impacts to Piute Spring, it is appropriate to consider that annual recharge of about 1,140 acre-feet per year occurs in that portion of the Valley with potential flow toward Piute Spring and/or Piute Range.

4.3.3.5 Water Quality

1. The Mark Group (1988) has provided water quality data for wells and springs in the Lanfair Valley area. The data include historical information determined from available references, and recent analyses of samples obtained from wells and Piute Spring. In general, the data indicate that ground water in the area is of good quality, suitable for drinking or industrial use.

4.4 VEGETATION

1. This section provides a description of the vegetation communities which occur in Lanfair Valley and on the project site. Plant species known or expected to occur in the vicinity are reviewed to assess: (1) the potential occurrence of rare, threatened, or endangered species, and (2) impacts of the loss of wildlife habitat.

2. The following discussion is based upon accumulated information on plant communities and assemblages, sensitive plants, study of aerial photographs, and field studies of the project site and surrounding area. Previous field studies completed by Gould (1987a,b) are on file and available for public review at the BLM Needles Resource Area office and at the San Bernardino County Planning Department.

3. Previous field studies were supplemented in June 1988 for the project area and the proposed Searchlight Access Route. Vegetation of the Castle Mountain Project area was inventoried by Alan Romspert, Assistant Director, Soda Springs Field Station of the California State University Desert Consortium, and by David Charlton of the Rancho Santa Ana Botanical Gardens of the Claremont Colleges. The botanical inventory was accomplished through field identification and specimen collection. Plants not immediately identified in the field were collected and verified using specimens in the Rancho Santa Ana Botanical Gardens herbarium.

4. A comprehensive plant species list is provided in Appendix C. Results of field studies, literature review, and consultation with experts on desert flora and agencies indicate that no Federal- or State-listed threatened or endangered plant species are expected to exist in the vicinity of the proposed Castle Mountain Project site.

4.4.1 PLANT COMMUNITIES AND CHARACTERISTIC SPECIES

1. Plant species are distributed according to many factors, including soil type, climate, and available water. In the Mojave Desert, species are often represented along an elevational gradient. Plant species vary as the finer grained soils of valley floors change to coarser deposits on lower slopes (alluvial fans or bajadas) and to rocky substrate on mountain slopes. Local climatic conditions which affect species distribution are in part influenced by increases in elevation and related lower temperatures and greater precipitation. In general, a gradual change in plant species occurs from lower to higher elevations, with a different combination of species represented at any point.

2. For purposes of discussion, groups of commonly associated plant species are often referred to as plant communities, identified by a conspicuous (if not always dominant) plant species. For this investigation, the vegetation is described for the following four recognized plant communities:

   - Creosote bush scrub
   - Joshua tree woodland
   - Blackbush scrub
   - Pinyon-juniper woodland

   In addition, two stands of vegetation designated in the Desert Plan as unusual plant assemblages (UPAs) are found in the region. These are:

   - Desert grassland, which usually occurs as understory to the creosote bush scrub or Joshua tree woodland vegetation communities.
   - Riparian, which occurs along the Piute Creek perennial stream.

4.4.1.1 Regional Vegetation

1. The plant communities below are described as they occur in this region of the Mojave Desert, especially in the Ivanpah, Piute, and Lanfair Valleys.

2. The creosote bush scrub community occurs on the valley floor and lower slopes of alluvial fans, generally below elevations of about 4,000 feet. Common species of this community include the creosote bush (*Larrea tridentata*), Mojave yucca (*Yucca schidigera*), burrobush (*Ambrosia dumosa*), mormon tea (*Ephedra nevadensis*), and fiddleneck (*Amsinckia intermedia*). Desert washes in this community support additional floristic components, the most common being the desert almond (*Prunus fasciculatus*) and catclaw acacia (*Acacia greggii*). The creosote bush sometimes grows in a clonal form which, over time, creates a ring. Carbon dating has shown that some of these rings may be hundreds or even thousands of years old (Vasek, 1980).

3. Joshua tree woodland occurs on gentle slopes with sandy or gravelly soils at elevations between about 3,700 and 4,400 feet in northern Lanfair Valley. The most visible plant in this community is the Joshua tree (*Yucca brevifolia jaegeriana*), which is a member of the agave family. The trees can reach heights of 10 to 30 feet and are scattered, with shrubs and herbs between. Other common species in this community include matchweed (*Gutierrezia microcephala*), cheesebush (*Hymenoclea salsola*), staghorn cholla (*Opunita acanthocarpa*),

and the Mojave yucca. Average densities of Joshua trees and Mojave yuccas in this area are estimated at four or more plants per acre for each species. The densities of both species decrease sharply on steeper slopes and at higher elevations.

4. The blackbush scrub community is dominated by blackbush (*Coleogyne ramosissima*). This plant community overlaps the Joshua tree woodland and occurs at elevations above about 4,200 feet on gentle slopes of the upper alluvial fans. Other common species include matchweed and desert trumpet (*Eriogonum inflatum*). Also common in this community are several species of the Cactaceae family: pancake prickly pear (*Opuntia chlorotica*), buckhorn cholla (*Opuntia acanthocarpa coloradensis*), and the barrel cactus (*Ferocactus acanthodes lecontei).*

5. Isolated areas of the pinyon-juniper woodland community occur on hills in northern Lanfair Valley (such as near Barnwell) where elevations reach about 5,200 feet. This community, which also occurs in small pockets in the vicinity of Hart Peak and the Castle Peaks, becomes extensive in the higher New York Mountains. Common species include the single-needle pinyon pine (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*), with shrubs between.

6. A riparian (or water-related) plant assemblage occurs at Piute Spring, located at the southeastern limit of Lanfair Valley. This riparian woodland is similar to the Colorado River bottomland woodland which occurs on the lower Colorado River along the California-Arizona border. The overstory is dominated by willow (*Salix gooddingii*) and cottonwood (*Populus fremontii*). Common understory species include narrowleaf willow (*Salix exigua*), mule fat (*Baccharis glutinosa*), and California bulrush (*Scripus californicus*). Riparian areas are classified by the California Desert Conservation Area (CDCA) Plan as highly sensitive UPAs. The Piute Creek area is such a UPA.

7. Most of the floor of Lanfair Valley is covered by an understory of grasses. These grasses typically occur on well drained soils within the Joshua tree woodland community. The species composition varies in response to local variation in soil nutrients and moisture. Additionally, grazing is an important factor in determining the floristic composition of grasslands. The project study area and Lanfair Valley are presently being grazed and have been for decades. Natives showing the highest densities are big galleta (*Hilaria rigida*), fluff grass *(Erioneuron pulchellum)*, muhlenbergia *(Muhlenbergia porteri)*, and grama grass *(Bouteloua spp.)*. Desert grassland is classified as one of 13 UPAs within the EMNSA

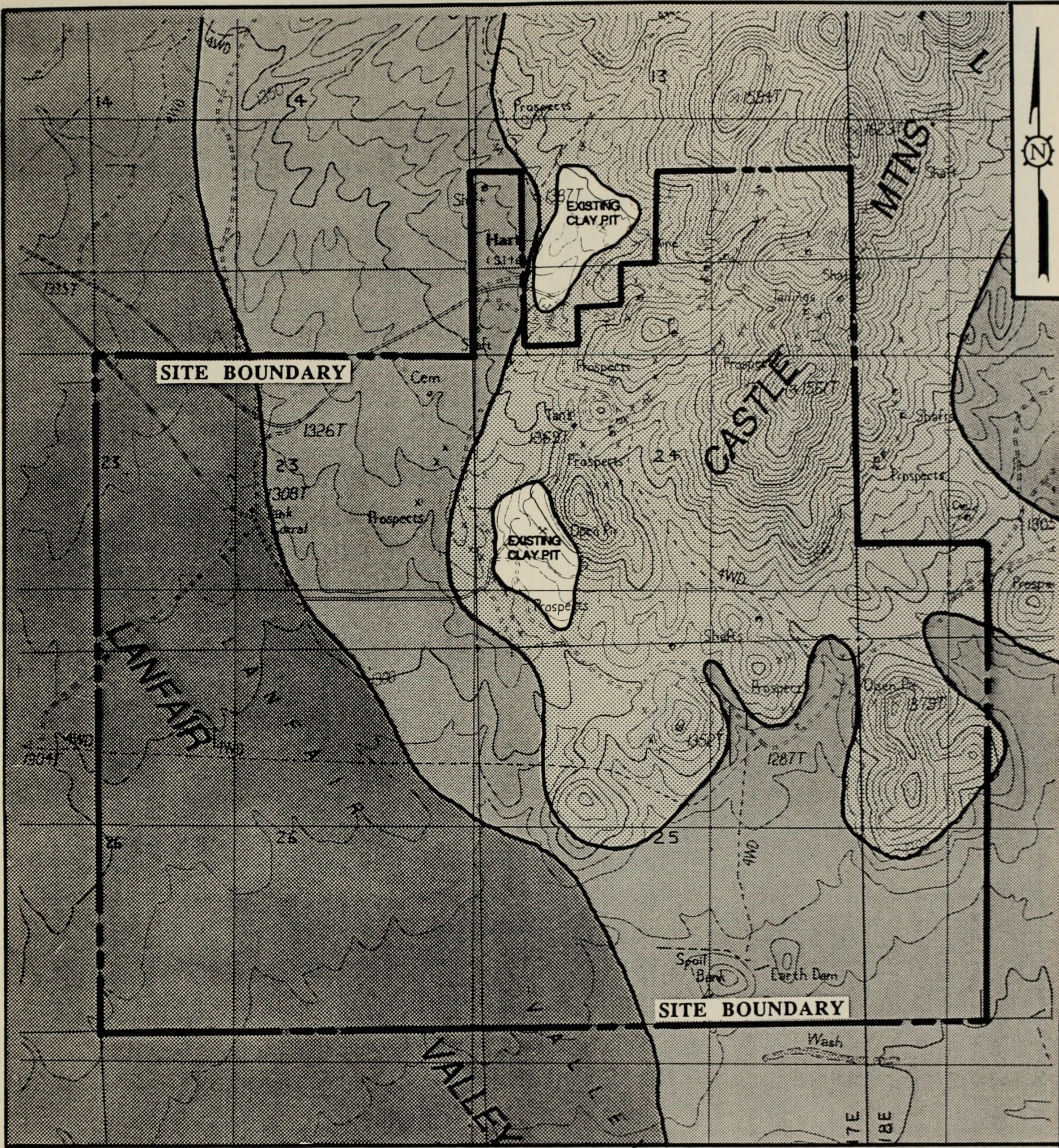
(BLM, 1980). UPAs were designated in the CDCA Plan as unusual based on one or more conditions, including restricted habitat, discontinuous distribution, age, size, or density. Each UPA is assigned a sensitivity rating which is based on its ability to recover from habitat disturbance. The scale of sensitivity ranges from "highly sensitive" to "very sensitive" to "sensitive" to "subject to disturbance but not as sensitive." The Lanfair Valley desert grassland UPA is classified as "subject to disturbance, but not as sensitive" (BLM, 1988). This designation reflects the grassland's ability to recover following disturbance. Desert grassland UPA covers about 200,000 acres of Federal-, State-, and privately-owned lands in Lanfair Valley.

4.4.1.2 Project Site Vegetation

1. A map depicting the distribution of plant communities at the project site is shown in Figure 4.4.1, Plant Communities. Plant communities along the access roads are not shown, but are represented by the Joshua tree woodland and creosote bush scrub communities, as discussed below. The floral composition of the communities represented is typical of Lanfair Valley and the Mojave Desert, as described above. Perennial plant cover is commonly about 10 to 15 percent.

2. The proposed project site lies at an elevation generally between 4,100 and 5,100 feet. The West Well Field is also located within this elevation range. The Searchlight Access Route follows the alluvial floor of Lanfair Valley north from the site to a maximum elevation of about 4,600 feet, then drops to an elevation of about 3,500 feet in Piute Valley. The two dominant plant communities which overlap the project site are Joshua tree woodland and blackbush scrub. Elements of the creosote bush scrub community overlap the Joshua tree woodland at lower elevations, such as in the area of the West Well Field and along the westerly portion of the Searchlight Access Route. Vegetation along the easterly portion of the Searchlight Access Route (in Piute Valley) is of the creosote bush scrub community.

3. About 1,000 of the 200,000-acre Lanfair Valley desert grassland UPA occurs over the lower portion of the project site, as shown in Figure 4.4.2, Creosote Bush Rings and Unusual Plant Assemblage. This grassland is characterized by the presence of numerous species of perennial grasses found in Lanfair Valley and is used for cattle grazing.



PLANT COMMUNITIES

COMMUNITY	ACRES WITHIN PROJECT BOUNDARY
DESERT GRASSLAND/ CREOSOTE BUSH SCRUB/ JOSHUA TREE WOODLAND	985
JOSHUA TREE WOODLAND	650
BLACKBUSH SCRUB	1,060
UNVEGETATED CLAY PITS	40
	TOTAL 2,735

CONTOUR INTERVAL: 10 METERS

REFERENCE: 7.5 MIN. U.S.G.S. TOPOGRAPHIC MAPS OF HART PEAK, CALIF. - NEV., AND CASTLE PEAKS, CALIF. DATED: 1984 SCALE: 1:2000

0 .5 1 MILE

SCALE

FIGURE 4.4.1

PLANT COMMUNITIES

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

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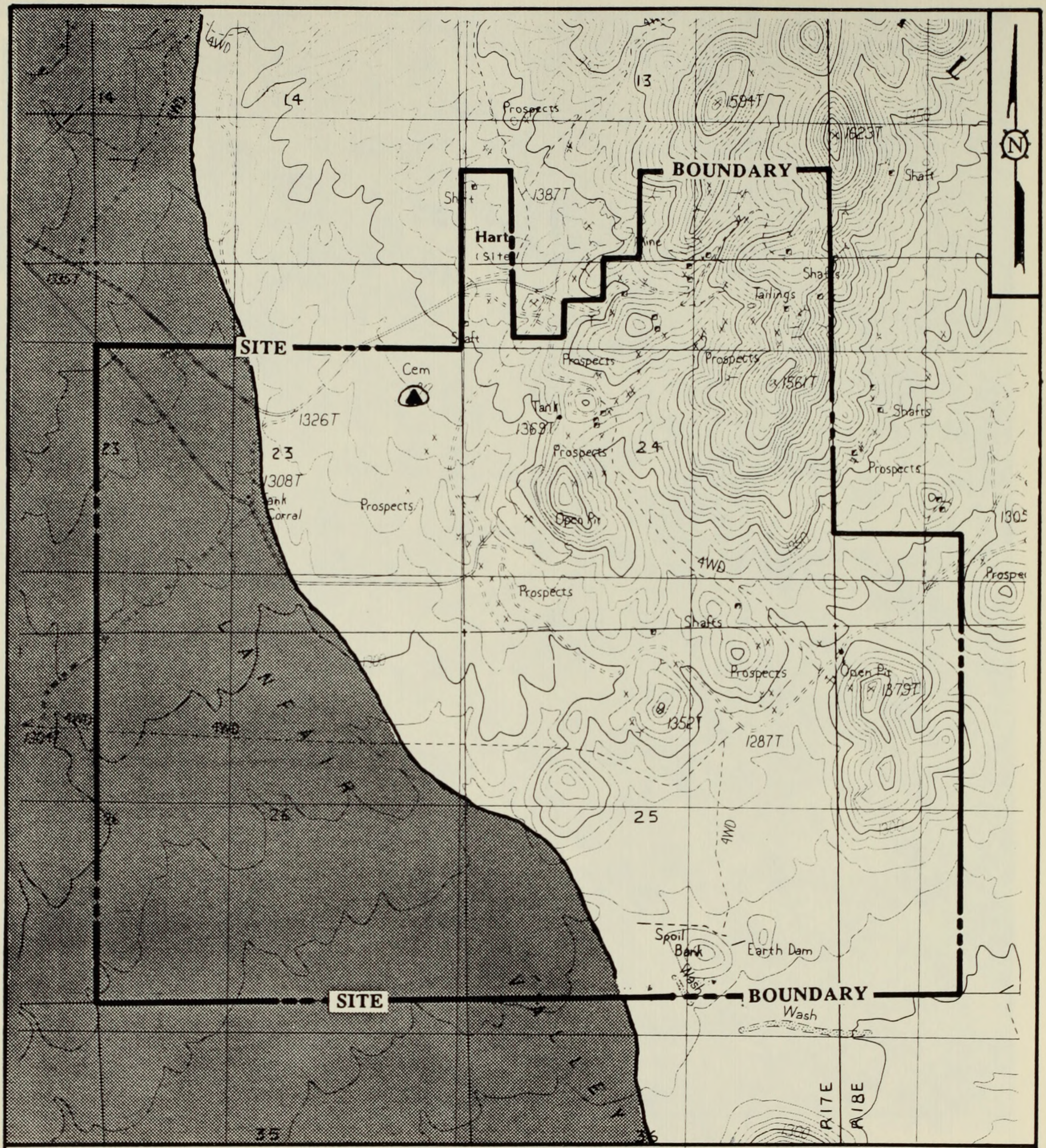

LEGEND

	ACRES ONSITE
▲ AREA OF CREOSOTE RINGS	--
DESERT GRASSLAND UPA	985

CONTOUR INTERVAL: 10 METERS

REFERENCE: 7.5 MIN. U.S.G.S. TOPOGRAPHIC MAPS OF HART PEAK, CALIF. -NEV., AND CASTLE PEAKS, CALIF. DATED: 1984 SCALE: 1: 2000

0 .5 1 MILE

SCALE

FIGURE 4.4.2

CREOSOTE BUSH RINGS AND UNUSUAL PLANT ASSEMBLAGE

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4. Five creosote bush rings were noted by Gould (1987a) in the northern portion of the project site, as noted in Figure 4.4.2. Creosote rings are clones of an individual plant that have expanded radially over time. These rings have been studied extensively in the western Mojave Desert by Vasek (1975). The size of the ring diameter is believed to be indicative of the plant's age. The 10- to 15-foot diameter of the rings on the project site indicate maximum ages of several hundred years.

5. Creosote bush scrub is the dominant vegetation community for about the eastern 9.5 miles of the proposed Searchlight Access Route (along County Road A68P) in Piute Valley. The remaining 10.8 miles of this alignment, including the portion of road to be improved, would pass through creosote bush scrub and Joshua tree woodland in northern Lanfair Valley.

4.4.2 SPECIAL INTEREST SPECIES

1. Data bases indicating plant species of special interest are available. The list of plant species known or expected to occur in the project area was reviewed in conjunction with the following:

   - Federal Register Listing - U.S. Fish and Wildlife Service (FWS) (pursuant to Federal Endangered Species Act).
   - California Department of Fish and Game - California Natural Diversity Data Base (CNDDB) provides current legal status and geographic coordinates for species of concern.
   - Bureau of Land Management List - Incorporates Federal and State lists, and some organizational listed species.
   - California Native Plant Society Inventory - California Environmental Quality Act guidelines support organizational lists for species which meet State list criteria.

2. Appendix C, Table 2, indicates the special interest plants which are expected to occur in the vicinity of the project site. No Federal- or State-listed or proposed endangered or threatened species are known or expected to occur on or in the vicinity of the project site. However, the Category 2 "candidate" species *Penstemon stephensii* may occur in the area. Gould (1987b) also observed two "non-candidate" species including Category 3C white forget-me-not (*Cryptantha tumulosa*) and wild buckwheat (*Eriogonum heermannii floccosum*) during previous onsite inventories at upper elevations. The barrel cactus is represented as part of a Castle Mountain population which extends offsite northerly and easterly from the project site. This species, which was previously identified as the Category 2 candidate *Ferocactus*

acanthodes acanthodes (Gould, 1987a) has since been confirmed by the Rancho Santa Ana Botanic Gardens (Claremont, California) to be the related species *Ferocactus acanthodes lecontei*. *F. acanthodes lecontei* does not appear on any of the data bases for species of concern.

5. *Penstemon stephensii*, a Category 2 candidate, was tentatively identified on the site by Gould (1987a); positive identification was not possible as the species observed was not in flower. Later investigations for this report failed to ascertain its existence. *P. stephensii* generally occurs on rocky slopes at elevations between 5,000 and 6,000 feet in the blackbush scrub community. It is known from the Kingston and Providence Mountains and the Midhills, and often is found on sites where soil disturbance has occurred.

6. During the scoping process, concern was raised that some additional special interest plant species may occur in the site area. Literature studies and onsite investigations do not indicate the presence of these species, which include:

   - Viviparous foxtail cactus (*Coryphantha vivipara rosea)* and Clark Mountain agave *(Agave utahensis nevadensia*). These do not occur on the site presumably because they are normally restricted to areas with limestone substrate. These plants are Federally recognized as Category 3C (non-candidate) species, and have been removed from BLM's "sensitive" species list.
   - Thorne's wild buckwheat (*Eriogonum ericifolium thornei*) is a Category 2 candidate that occurs in the New York Mountains only and is not expected in the Castle Mountains.
   - Bicolored penstemon (*Penstemon bicolor roseus*) is indicated as a special interest species in Nevada, but not in California. It is not known or expected to occur on the project site.

4.5 WILDLIFE

1. Information on wildlife is based upon previous research and field studies completed in April 1987 (Gould, 1987a,b) for the initial Plan of Operations, and supplementary studies completed in May, June, and October 1988 for this document. Field studies were completed for the study area and along the proposed Searchlight Access Route that was identified in Section 4.1, Introduction. Information on habitat types, animals observed, and observations of tracks and scat was recorded in field notes and on topographic maps or aerial photographs. Abandoned mine workings were investigated for their potential as habitat for bats or other species. Based upon the field studies and review of literature for known and expected species distributions, comprehensive species lists were prepared and are included in Appendix C.

2. Information on the biological resources of the area, including details on specific organisms, their ranges and activities, has been compiled by Dr. Bayard Brattstrom of California State University, Fullerton based upon 40 years of desert research. Resources include information published by Dr. Brattstrom and numerous other investigators, standard field guides, faunal studies completed for BLM, and other available environmental impact studies. The California Department of Fish and Game (DFG) and other experts on desert biota were consulted as appropriate, especially for special interest species such as the desert tortoise, bighorn sheep, and some species of bats and birds. The assessment of onsite habitat for bats was completed by Dr. Michael O'Farrell. A list of bats expected to occur in the Castle Mountains was prepared and is included in Appendix C.

3. This section provides a description of the habitats and animals which are known or expected to occur in the region and on the project site. The wildlife conditions at the project site and along the proposed Searchlight Access Route are similar, so both are included in a single discussion of the existing environment. Particular attention has been given to species of special interest, such as the bighorn sheep and desert tortoise. The potential project effect to wildlife is addressed in Section 5.5.

4.5.1 REGIONAL WILDLIFE HABITATS AND CHARACTERISTIC SPECIES

1. The habitat of wildlife species can often be correlated to the plant communities in which they live. Eastern Mojave Desert habitats, especially creosote bush scrub and Joshua tree woodland, are widespread and therefore support a fauna that itself consists of mostly widely distributed species. Most of the vegetation in the Lanfair Valley region consists of Joshua tree woodland and creosote bush scrub. Access roads to the site traverse creosote bush scrub and Joshua tree woodland from the west in Ivanpah Valley, from the northeast in Piute Valley, and from the south in Lanfair Valley. Other plant communities, including blackbush scrub, pinyon-juniper woodland, and riparian and desert wash assemblages, occur over a maximum of about 10 percent of the total area in this region of the Mojave Desert.

4.5.1.1 Amphibians

1. One amphibian, the red-spotted toad *(Bufo punctatus)* (Stebbins, 1986) is expected to occur in the region. This toad is known to occur at desert springs and ephemeral water sources in desert canyons. It occurs at Piute Spring and is expected to occur in the New York Mountains to the west, where reliable water sources can be found.

4.5.1.2 Reptiles

1. The reptile species which may be found in the region (see Appendix C) are typical of similar locations in the eastern Mojave Desert (see Stebbins, 1986). Most are widely distributed species of lizards and snakes. Two reptiles are of special interest: the desert tortoise and the Gila monster.

2. The desert tortoise *(Gopherus agassizii)* is of limited abundance at the elevation of the northern portion of Lanfair Valley, but large populations are well documented in the lower elevation Ivanpah and Piute Valleys. Gould (1987a) found a desert tortoise shell on the project site, and subsequent onsite studies have confirmed the potential for tortoises through location of burrows. The desert tortoise is discussed in detail below as a special interest species.

3. The Gila monster *(Heloderma suspectum)* is known from the Clark Mountains north of Lanfair Valley and is variously reported (but not documented by specimens) to occur in the vicinity of the New York and Providence Mountains (Bradley and Deacon, 1966; Stebbins,

1986). There are other reports of specimens seen in the surrounding area (such as at Piute Spring), but these reports are not yet documented either in the literature, or with specimens in museums.

4.5.1.3 Birds

1. Most of the birds expected to be found in the Lanfair Valley region may not be permanent residents, but simply fly over, forage, or feed in the area for a short time, often seasonally (see Appendix C) . Because of the absence of water, their numbers are expected to be limited. The birds listed are widely distributed desert species.

2. Several raptors (falcons, eagles, vultures, hawks, and owls), all widely distributed species, occur or are expected to occur within the region. These raptors are of interest because of their role in the natural ecosystem balance and are known to feed throughout the Lanfair Valley area. Owl species, the kestrel, and possibly the red-tailed hawk *(Buteo jamaicensis)* may nest in the study area. An immature golden eagle *(Aquila chrysaetos)* was observed in Lanfair Valley by Gould (1987b) about three miles south of the proposed project site. This species probably nests at higher elevations and cliffs in the New York Mountains and elsewhere in the region and forages widely throughout the desert. Though not listed as threatened or endangered, the golden eagle is a fully protected species in California (DFG Code, Section 3511) and receives additional Federal protection under amendments to the Bald Eagle Protection Act (PL 92-535). Raptors and many other birds are protected from hunting by the Federal Migratory Bird Treaty Act.

3. Several bird species listed by the California Natural Diversity Data Base (CNDDB) as "sensitive species" are known to occur in the region and expected to occur on the project site. Prairie falcon (*Falco mexicanus*) and Bendire's thrasher (*Toxostoma bendirei*) are known to occur in Lanfair Valley to the south. Gray vireo (*Vireo vicinior*), and Swainson's hawk (*Buteo swainsoni*) have also been noted (Gould, 1987a,b). These are species of fairly wide distribution, but the prairie falcon and Swainson's hawk are not common.

4. Open pools of water often attract migrating shore, aquatic, and water birds. Those that visit pools of water at the edge of the mostly dry Soda Lake, located some 50 miles to the west of the proposed project site, are listed in Appendix C. Some of these species may occasionally visit areas of Lanfair Valley where there is standing water, such as at livestock watering facilities.

4.5.1.4 Mammals

1. Lists of mammals observed or expected to occur in Lanfair Valley are presented in Appendix C. Most are common and wide-spread species typical of high desert areas. Common species include the coyote (*Canis latrans*), blacktail jackrabbit (*Lepus californicus*), desert cottontail (*Sylvilagus auduboni*), and the whitetail antelope ground squirrel (*Ammospermophilus leucurus*). Desert woodrat (*Neotoma lepida*) nests have been observed on the project site by Gould (1987a). Several species of mice (*Peromyscus spp.*) and other common small mammals also are expected to be present. Desert bighorn sheep (*Ovis canadensis*) live in the surrounding mountains. This species is discussed in detail below as a special interest species.

2. Bats are expected to occur among the rocks and Joshua trees of Lanfair Valley, which provide daytime roosts and nursery sites for bats, as well as sites for winter hibernation. Abandoned mine tunnels of the Hart Mining District could potentially provide habitat for bats. A list of bats expected to occur in the Castle Mountain area is provided in Appendix C. The list includes residents and seasonal migrants. Year-round residents in the project area are expected to include the Yuma myotis *(Myotis yumanensis)*, California myotis *(Myotis californicus)*, western pipistrelle *(Pipistrellus hesperus)*, and pallid bat *(Antrozous pallidus)*. Seasonally, the California leaf-nosed bat *(Macrotus californicus)*, fringed myotis *(Myotis thysanodes)*, big brown bat *(Eptesicus fuscus)*, Townsend's big-eared bat *(Plecotus townsendii)*, and Brazilian free-tailed bat *(Tadarida brasiliensis)* would be expected. In the spring, the silver-haired bat *(Lasionycteris noctivagans)* and hoary bat *(Lasirius cinerius)* are known to migrate through this area. Most of these species roost individually or in small groups, rather than in large colonies, and they tend to use fissures in rocks. Special interest bat species are addressed in detail in the following section.

4.5.2 SPECIAL INTEREST SPECIES

1. Several species of wildlife considered to be of special concern by resource agencies and/or conservation organizations were identified as occurring or potentially occurring within the vicinity of the project site. These species are of special concern for a variety of reasons, including: (1) their populations are declining, (2) they are especially vulnerable to habitat change, or (3) they have restricted distributions and are naturally rare. These include five species of birds (golden eagle, Swainson's hawk, prairie falcon, Bendire's thrasher, and gray vireo), two reptiles (desert tortoise and Gila monster), and three mammals (bighorn sheep, California leaf-nosed bat, and Townsend's big-eared bat).

4.5.2.1 Birds

1. As described above, a golden eagle, a species protected by Federal legislation, was sighted south of the proposed project site, and it is expected that these birds occasionally forage over the site. Four other species of interest are not afforded legal protection (other than from hunting) but are referred to by the CNDDB as "sensitive species" and are expected to use the project area as habitat for forage or breeding. Two of these, Bendire's thrasher and prairie falcon, have been sighted in the surrounding area. Bendire's thrasher is widespread in this region, and individuals were recorded onsite during the inventory in the creosote bush scrub community (Gould, 1987a). This species prefers open farmlands, grasslands, and brushy desert and often nests in cacti. The Bendire's thrasher is a migrant to the Lanfair Valley area, arriving in spring for breeding. Two other species, gray vireo and Swainson's hawk, are known to occur in the area and have been sighted in southern Lanfair Valley. The latter is a Category 2 candidate species.

4.5.2.2 Desert Tortoise

1. The desert tortoise is designated by BLM as a "sensitive" species, by the DFG and the State of Nevada to be a "fully protected" species, and it is recommended for inclusion on the list of threatened and endangered species by the FWS. Listing has thus far been precluded by other species. It is currently a Category 1 candidate species. The tortoise has been extensively studied by BLM through the interest, research, and activities of Dr. Kristin Berry of the Riverside office and by researchers at various universities, agencies, and state (California, Nevada, Utah, and Arizona) and federal (U.S. and Mexico) governments. Desert tortoise populations have declined over the last 50 years due to taking of animals as pets, shooting, road kills, raven predation, destruction of burrows by off-road vehicles and cattle, reduction in habitat, destruction of habitat quality, and diseases. In response to this decline, BLM has recently adopted a rangewide plan for managing desert tortoise habitat (BLM, 1988c). Statewide strategies for implementing the rangewide plan are currently being developed.

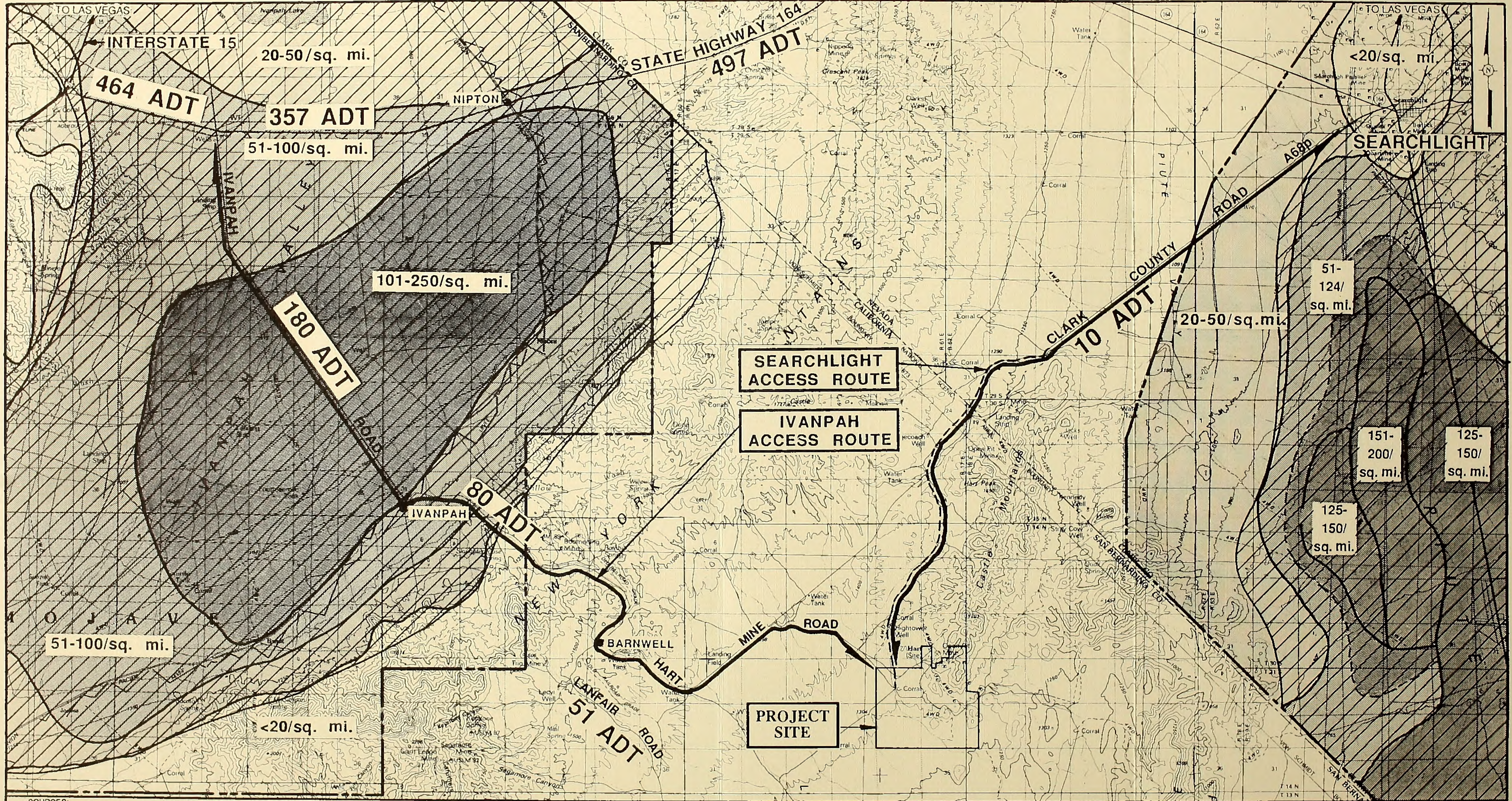
2. The estimated densities of tortoise populations occurring in the region of the proposed project as studied by Berry (1984) are shown in Figure 4.5.1, Desert Tortoise Habitat and Proposed Access Roads. As indicated on this map, there are large desert tortoise populations in the Ivanpah and Piute Valleys, mostly at elevations below 3,700 feet. Areas with population densities up to 250 individuals per square mile exist in Ivanpah Valley to the west, and areas

with up to 200 individuals per square mile occur in Piute Valley to the east. Major population areas and areas termed "crucial habitat," as determined by BLM in the CDCA Plan and Clark Management Framework Plan, are also shown for Ivanpah and Piute Valleys in Figure 4.5.1. Crucial habitat areas are considered essential to the continued existence of the species.

3. Desert tortoise densities in the vicinity of roads are impacted by traffic. Portions of the Ivanpah Road (through Ivanpah Valley) and Clark County Road A68P (through Piute Valley) cross areas of known desert tortoise populations. Because the proposed project would use these roads, the impact of additional traffic is of concern. The potential for the Castle Mountain Project to contribute to this impact is discussed in detail in Section 5.5.1.2, Operations Impact on Wildlife.

4. BLM studies (Berry, 1984) have not previously indicated the presence of significant numbers of desert tortoise in Lanfair Valley. The absence of a population has generally been attributed to the high elevation, since the majority of Lanfair Valley is above 3,700 feet and desert tortoise commonly occur below this elevation. Past activities of man such as agriculture and grazing may also have affected tortoise densities and distribution. However, more recent studies suggest that a limited number of desert tortoise may exist at lower elevations in eastern Lanfair Valley. The presence of desert tortoise in the area was suspected by Gould (1987a) when a desert tortoise shell was found during an onsite wildlife inventory. A live tortoise was subsequently observed south of the proposed project site (Section 36, T.14N., R.17E.) during a cultural resource inventory (UNLV, 1987).

5. To assess the potential for desert tortoise to occur on the Castle Mountain Project site, field transects were walked to look for tortoises, tortoise sign (scat, tracks), and burrows in October 1988. No tortoises or other signs were found, but burrows were identified. The absence of tortoises and sign was attributed to warm weather, but the presence of the burrows indicates that tortoises have been present on the lower portions of the site (in Section 26) and in adjacent offsite areas (in Sections 34, 35). The burrows were found in decomposed granite in a series of washes, and in an area where little cattle grazing occurs. These burrows were mapped and counted in an attempt to determine tortoise densities. Based upon this data, it is estimated that a population of about five tortoises per square mile may be present. However, Berry (1988) notes that burrows are unreliable for determining tortoise densities because they are difficult to locate and it is difficult to determine if a burrow is in use or has been abandoned for days, months, or even years. Supplementary studies are planned in the spring of 1989 to ascertain the absence or presence and density of desert tortoise in the area.



SOURCES:

1. ADT BASED ON 1988 COUNTS BY SAN BERNARDINO COUNTY, CA., AND CLARK COUNTY, NV., EXCEPT CLARK COUNTY ROAD A68p, WHICH IS BASED UPON OBSERVTIONS FOR THIS STUDY
2. TORTOISE DENSITY AND DISTRIBUTION AFTER BERRY (1984)
3. PIUTE VALLEY CRUCIAL HABITAT FROM: U.S. DEPT OF INTERIOR, BLM, LAS VEGAS DISTRICT, STATE LINE RESOURCE AREA, 1983, CLARK COUNTY MANAGEMENT FRAMEWORK PLAN
4. IVANPAH VALLEY CRUCIAL HABITAT FROM: U.S. DEPT. OF INTERIOR, BLM, DESERT DISTRICT, 1981, THE CALIFORNIA DESERT CONSERVATION AREA PLAN

ROAD CHARACTERISTICS (1)

80 ADT — AVERAGE DAILY TRAFFIC

EXISTING ROAD ALIGNMENT/ PROPOSED ACCESS ROUTE

PROPOSED ROAD ALIGNMENT/ PROPOSED ACCESS ROUTE

TORTOISE DENSITY (2)

HIGH — LOW

MEDIUM — VERY LOW OR NONE

CRUCIAL HABITAT (3, 4)

20-50/sq. mi. — TORTOISE DENSITY (2) (TORTOISES/SQUARE MILE)

CONTOUR INTERVAL: 50 METERS

0 1 2 3 4 MILES

SCALE

REFERENCE:
30 x 50 MINUTE U.S.G.S. TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA-NEVADA, AND DAVIS DAM, ARIZONA-NEVADA
SCALE: 1:100,000
DATED: 1985 AND 1982, RESPECTIVELY

FIGURE 4.5.1

DESERT TORTOISE HABITAT AND PROPOSED ACCESS ROADS

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4.5.2.3 Desert Bighorn Sheep

1. The bighorn sheep is designated by BLM as a sensitive species. It is protected by State law and is illegal to hunt except when specifically authorized. Although bighorn sheep were formerly widespread throughout the southwestern U.S., today they occur in isolated populations. Those in the desert are usually associated with mountain ranges. Bighorn sheep are known from the Castle Mountains and have been observed on the site (Gould, 1987a,b). Barring harassment, bighorn quickly habituate to the presence of humans and may be little disturbed by their activities (Weyhausen, 1988).

2. Details about the number and activity of sheep in the Castle Mountains have been derived from many sources, especially the studies of Turner (1973), Weaver (1982), Weaver and Hall (1982), and Weyhausen (1988). Weyhausen's studies have been based on helicopter flights and the tagging of sheep, and were completed for DFG. The distribution of local populations is important relative to the proposed project because the bighorn sheep use plant communities and mountains as habitat. Radiotelemetry studies have shown that bighorn sheep do not move or migrate substantially, but instead remain within a preferred habitat area. The distribution of bighorn sheep in the vicinity of the project site is described in the following:

   - About 15 bighorn sheep inhabit the Castle Mountains. This population is low for such a mountainous area. The sheep apparently spend considerable time around several of the springs and wells on the rugged topography of the northern Piute Range and eastern slopes of the Castle Mountains (Weyhausen, 1988).
   - It is believed that there are no bighorn sheep in the Castle Peaks area of the New York Mountains (about five miles north of the site) and that the population that previously occurred there became extinct in 1980.
   - Between three and eight bighorn sheep inhabit the southern portion of the Piute Range and frequent the Piute Spring area.

4.5.2.4 Bats

1. Although no California bats are currently listed as threatened or endangered by State or Federal agencies, a recent compilation of mammalian species of special concern has been performed for the DFG (Williams, 1986). This listing, which includes first and second priority species, carries no legal status at present, but the various regulatory agencies use it as a management guide. Of the bats expected to occur on the project site, two are second priority

species: California leaf-nosed bat and Townsend's big-eared bat. Both are currently Category 2 candidate species and, as such, are under review by the DFG for proposed listing as threatened.

2. The Castle Mountains are located near the northern limits of the range of the California leaf-nosed bat. The known distribution of this species is currently along the Colorado River, although historically, a large population occurred in the eastern Las Vegas valley (O'Farrell, 1970). The California leaf-nosed bat forages during the early, warmer evening hours when insects are active. This species does not hibernate and is found in warm tunnels or caves during the winter. The open configuration of mine shafts and adits at the project site is expected to maintain cool temperatures which would preclude substantial use by this bat.

3. Townsend's big-eared bat migrates elevationally to locate suitable hibernals, usually at higher elevations with low, constant temperatures. This bat periodically moves from one hibernal to another and will forage and drink when possible during this time. Evaluation of the project site indicates that the shafts and adits may minimally fit the habitat requirement of this species, and individuals may occur as transient hibernators during the winter months.

4. Three other Category 2 candidate bat species known in the eastern Mojave, including the occult bat (*Myotis lucifugas cultus*), spotted bat (*Euderma maculatum*), and greater mastiff bat (*Eumops perotis californicus*) are not expected to use habitat in the vicinity of the project site. The habitat requirements of these species include lower elevation areas or large water bodies (such as the Colorado River) not found in the project vicinity.

4.5.3 PROJECT AREA WILDLIFE

1. Habitats at the project site are typical of the Mojave Desert. Field studies completed for this report did not reveal any unusual or crucial habitat types or habitat of threatened or endangered species, although some special interest species do use the site for habitat. No permanent water sources exist onsite, so no aquatic fauna are expected.

2. It is expected that many of the widely distributed animal species found in the eastern Mojave Desert and Lanfair Valley could also be found on the project site. Animals which are not expected to occur include the red-spotted toad, and aquatic migratory birds, due to the lack of reliable water. Most of the onsite species forage and breed in the Joshua tree woodland habitat at intermediate elevations. Bighorn sheep have been observed at upper elevations on the

project site (Gould 1987a). As discussed, evidence of burrows suggests that a relatively low-density population of desert tortoise may inhabit lower portions of the site and adjacent areas in eastern Lanfair Valley.

3. It has been suggested that bats and other wildlife may use onsite habitat provided by abandoned mine shafts and adits, as substitutes for natural caves. Exploration geologists have been in many of the existing shafts and adits, but have not observed evidence of bats, suggesting that use of these facilities is limited or nonexistent for individual bats and that use by colonies is unlikely. However, individuals or small groups of bats may occur. The two abandoned mine openings known to have extensive underground workings are barricaded with wooden gates. These are not tight enough to exclude bats, but would hamper access for large group use.

4. Other species of concern that could use mine shafts and adits as habitat include ringtails (*Bassariscus astutus*) and several species of owls. The ringtail is a California protected mammal, and owls receive State and Federal protection as raptors. Examination of workings has not revealed the presence of these species, although some use of shafts and adits by owls would be expected.

5. Portions of the project site and adjacent areas have been partially disturbed by historic and recent human activities which have to some degree reduced the overall quality of habitat. The two clay pits are essentially devoid of vegetation. Along the Searchlight Access Route, evidence of human disturbance to wildlife habitat is mostly limited to dirt roads and off-road vehicle trails.

4.6 AIR QUALITY

4.6.1 CLIMATIC CONDITIONS

1. The Castle Mountain Project site is located in the eastern San Bernardino County portion of the Southeast Desert Air Basin. The Southeast Desert Air Basin includes the eastern portions of San Bernardino, Riverside, Kern, Los Angeles, and San Diego Counties, and all of Imperial County. The climate of the Basin is generally hot and dry in the summer and mild in the winter, with limited precipitation and cloudiness. Little climatic variation exists throughout the Basin.

2. Wind speeds in the Basin are usually above levels necessary to promote good mixing, thereby reducing the potential for stagnation, which can otherwise create conditions for poor air quality. Wind speeds average between 5 and 13 miles per hour. Summer and winter winds are similar, generally blowing from the south and west. Vertical air dilution is generally good because of the area's high surface temperatures, creating strong daytime thermal mixing. Thermal mixing and moderate winds generally tend to disperse occasional nighttime inversions.

3. From late fall to early spring, average daytime temperatures are moderate, averaging 60 to 85 degrees Fahrenheit. Nights are cooler, with temperatures averaging 40 to 60 degrees Fahrenheit. Winter temperatures are occasionally below freezing, and can be lower than 10 degrees Fahrenheit. During summer, temperatures are often 100 to 110 degrees Fahrenheit during the day and about 80 degrees Fahrenheit at night.

4. Precipitation in Lanfair Valley averages about eight inches per year. Precipitation most frequently occurs during winter months, but a significant portion of the annual rainfall can occur as summer thunderstorms, which may result in heavy rainfall and flash floods.

4.6.2 AMBIENT AIR QUALITY

1. National Ambient Air Quality Standards and California Ambient Air Quality Standards reflect the maximum levels of air pollutants permitted in the atmosphere. These standards for the types of emissions anticipated from the Castle Mountain Project operations are shown in

Table 4.6.1, Summary of Ambient Air Quality Data. Regulated pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), ozone (0_3), and particulate matter less than 10 microns in diameter (PM_{10}).

2. Ambient air quality standards are applied to air contaminants that exhibit known detrimental health effects and can be traced to direct emissions from a source (CO, SO_2, PM_{10}), or from chemical reactions between emitted pollutants downwind of a facility (NO_2, O_3, PM_{10}). The latter class of air pollutants is referred to as "secondary" pollutants because they result not from their direct emission from a pollution source, but from chemical reactions of "precursor" pollutants. Since it is not possible to regulate the emission of these secondary air pollutants, air quality regulatory agencies focus their regulations upon precursor pollutant emissions.

3. Secondary pollutants include nitrogen oxides (NO_x), ozone (O_3), and some particulates (PM_{10}). Nitrogen oxides are a precursor to ozone and NO_2 formation. Point source exhaust is normally in the form of nitric oxide (NO) that does not convert to NO_2 until long after it has drifted downwind of the emission point. Thus, it is a conservative approach to assume that 100 percent of the estimated NO_x emissions from a fuel combustion source are emitted as NO_2. Ozone results from the reaction of NO_2, reactive organic compounds (ROC); and sunlight. Thus, it is important to monitor the emission (or formation) of NO_2 and ROC in order to control ozone formation in the atmosphere. PM_{10} results from both the direct emission of particulate matter, and from photochemically-produced sulfate particles.

4. Air quality data are not available specifically for the project site. However, the San Bernardino County Air Pollution Control District (SBCAPCD) was contacted to ascertain the present attainment status, with respect to both National and State ambient air quality standards, for the project area. In addition, data were gathered from December 1981 to November 1982 for a proposed Southern California Edison California Coal Project at a site about 25 miles northwest of the project site in Ivanpah Valley. These data, presented in Table 4.6.1, have been used to prepare the Castle Mountain Project Authority to Construct permit (see Appendix F) since they are expected to be reasonably characteristic of air quality and meteorologic conditions in the region. The data therefore provide a baseline of ambient conditions to assess the potential project impacts.

5. Information provided by SBCAPCD officials indicates that the vicinity of the project area has been in attainment of National and State ambient air quality standards. The following Table

TABLE 4.6.1

SUMMARY OF AMBIENT AIR QUALITY DATA

POLLUTANT	AVERAGING TIME	CALIFORNIA STANDARD	NATIONAL STANDARDS		MEASURED[1] VALUES
			PRIMARY	SECONDARY	
Ozone (O_3)	1 hour	0.09 ppm	0.12 ppm	0.12 ppm	0.099[4]
Carbon monoxide (CO)	1 hour	20 ppm	35 ppm	35 ppm	1.1 ppm
Nitrogen dioxide (NO_2)	Annual Average	---	0.05 ppm	0.05 ppm	0.010 ppm
	1 hour	0.25 ppm	---	---	0.125 ppm
Sulfur dioxide (SO_2)	Annual Average	---	0.03 ppm	---	0.001 ppm
	24 hour	0.05 ppm	0.14 ppm	---	0.007 ppm
	3 hour	---	---	0.5 ppm	0.009 ppm
	1 hour	0.25 ppm	---	---	0.011 ppm
Particulates (PM_{10})[2]	Annual Geometric Mean	30 $\mu g/m^3$	50 $\mu g/m^3$	---	18
	24 hour	50 $\mu g/m^3$	150 $\mu g/m^3$	---	299[3]

(1) Source: Ivanpah Dry Lake Power Plant Preconstruction Monitoring Data, Southern California Edison (provided by URS 1989).
(2) PM_{10} values indicate measured TSP values scaled by the estimated percent of PM_{10} in the TSP (about 63 percent), per CARB guidelines.
(3) Highest recorded 24-hour value.
(4) Although this value is in excess of the CAAQS, SBCAPCD officials have determined that the region is in attainment with the CAAQS and at present is not in danger of being exceeded.

NA = Not Applicable

paragraphs summarize the 1982 Ivanpah Valley air quality data set, which describes all parameters, except ROC. No ROC values have been measured by agencies or project applicants in the vicinity of the Castle Mountain Project site. This is not a concern because, as mentioned above, the area is in attainment of the National and State ozone standard.

6. Data from Ivanpah Valley, as summarized in Table 4.6.1, reveal that ozone levels were recorded at 0.099 ppm for the maximum 1-hour value and 0.086 ppm for the second highest 1-hour value; the annual 1-hour average was 0.031 ppm. The average annual NO_2 concentration measured was 0.010 ppm, and the maximum 1-hour value was 0.125 ppm. NO_2 showed little seasonal variation in average values. Recorded sulfur dioxide levels were very low, with an annual average of 0.001 ppm, a maximum 24-hour value of 0.007 ppm, a maximum 3-hour value of 0.009 ppm, and a maximum 1-hour value of 0.011 ppm. Carbon monoxide values also were low, the measured maximum 1-hour value being 1.1 ppm.

7. At the time monitoring was conducted, the standard for dust was established based upon the amount of total suspended particles (TSP) generated; currently, the standard is based upon that portion of TSP which is respirable. The respirable portion is that which is smaller than 10 microns in diameter and is known as PM_{10}. For the Castle Mountain Project site, PM_{10} was assumed to be 63 percent of the TSP in accordance with California Air Resources Board guidelines. The average annual PM_{10} concentration determined from 161 separate 24-hour samples collected at the Ivanpah Valley monitoring site was calculated to be 18 $\mu g/m^3$. The maximum PM_{10} value has been calculated as 299 $\mu g/m^3$, and the second highest value has been calculated as 131 $\mu g/m^3$. Both of these measurements occurred in December during periods of high, gusty winds. These data indicate a common desert environment condition where high levels of dust can occur naturally during windy periods.

8. Although PM_{10} was not specifically measured at the monitoring site, the following assumptions can be made:

   - The average annual PM_{10} background concentration would be approximately 63 percent of the average annual TSP concentration (about 18 $\mu g/m^3$).
   - Exceedances of PM_{10} standards could be expected during periods of high winds.
   - These exceedances would be considered part of the natural background of the area.

9. Based on the Ivanpah Valley monitoring data and the lack of major pollution sources in the area, the overall air quality in the vicinity of the project site is expected to be good. No significant changes to the ambient air quality are expected to have occurred since the time these data were collected.

4.7 ENVIRONMENTAL HEALTH AND SAFETY

1. Existing conditions at the project site relative to environmental health and safety for the general public are the result of previous mining activities and current activities associated with an ongoing exploratory drilling program.

2. In accordance with BLM regulations 43 CFR 3802.5-2 and 43 CFR 3809.3-5, operators are required to take steps to remove hazardous conditions. The mine workings (shafts and adits) which were completed during previous mining periods present the greatest hazard to the general public. These workings have been closed with fencing, gates, or other appropriate barriers to prevent unauthorized access. Workings not posing a public safety hazard have been left open to provide wildlife habitat.

3. Current activity in the area of the proposed site is related to exploratory drilling and temporary road grading. Safety procedures set forth by the Mine Safety and Health Administration have been adhered to during these operations.

4. Numerous maintained and unmaintained dirt roads traverse Lanfair Valley and the proposed Castle Mountain Project site. Driving conditions on these roads are variable and can be hazardous at excessive speeds.

4.8 VISUAL RESOURCES

1. The following section includes a discussion of the visual quality and character of the proposed project site and surrounding region in compliance with BLM visual management objectives. Photographs showing existing views of the project area are presented and discussed in Section 5.8.

4.8.1 VISUAL MANAGEMENT

1. The project is located in the East Mojave National Scenic Area (EMNSA). Guidelines for management of this area have been defined in the EMNSA Plan (BLM, 1988a). The area, which covers about 1.5 million acres in the eastern Mojave Desert of California, is managed by BLM by attempting to limit the extent of change in the "characteristic landscape", using standards which are based on scenic quality and sensitivity of the area.

2. Visual Resource Management (VRM) values are assigned to areas based on a class system ranging from Class I to Class IV. Class I designates areas of greatest sensitivity; Class IV designates areas of least sensitivity. VRM is an analytical process used to identify and quantify scenic values and visual quality. The EMNSA was analyzed by the California Desert Conservation Area staff in terms of scenic quality, distance zones, management class, and contrast rating based upon VRM guidelines (BLM, 1981b). This analysis resulted in a VRM Class III rating for the southern Castle Mountains and the Hart Mining District. The objective of Class III is to partially retain the existing character of the landscape. This less restrictive class allows for a larger scale development or activity which would be an obvious and distinctive feature from the existing landscape (BLM, 1988a).

3. The EMNSA Plan established the policy that discretionary actions should be designed to meet the VRM Class II standard. Non-discretionary actions (such as mining) are required to be designed to be as visually unobtrusive as "best practices" allow.

4. The policies of the San Bernardino County General Plan for visual resources are related to designated scenic routes. The nearest County-designated scenic route is Interstate 15, from the Afton interchange to Baker. This route is about 50 miles west of Lanfair Valley; the proposed project site cannot be seen from this road segment.

4.8.2 REGIONAL CHARACTERISTICS

1. As described in the EMNSA Plan, the visual attributes of the EMNSA do not reside in any particularly spectacular feature, but in the area's spectacular range of features (BLM, 1988a). This variety in the desert landscape encompasses mountains and valleys, with vegetation ranging from pinyon-juniper forests to Joshua tree woodland to creosote bush scrub and blackbush scrub. Because of the variable topography and generally sparse vegetation, long distance views are commonly available. These two elements - variety and the long-distance view - are the most significant characteristics of the East Mojave's visual quality (BLM, 1988a).

2. Lanfair Valley exhibits characteristics common to the visual quality of the East Mojave region. The large, 340-square mile basin is enclosed by the Piute Range and the Hackberry, Woods, Table, New York, and Castle Mountains. The New York Mountains, which form the western boundary of the Valley, are notable as one of the highest ranges in the East Mojave, with elevations over 7,500 feet. The Castle Mountains form the northeastern limit of the Valley, reaching a height of about 5,400 feet at Hart Peak. Views of Lanfair Valley from higher elevations are expansive (see Figure 4.1.6, Project Site and Clark County Road A68P Photographs).

3. Human modifications in Lanfair Valley include the abandoned Barnwell and Searchlight Railroad grade, improved and unimproved dirt roads, and features related to past and present cattle grazing, agriculture, and mining activities. Corrals, water tanks, and fencing are scattered throughout the Valley in support of active grazing. Mining activities have occurred in the Castle Mountains, Vontrigger Hills, Signal Hill, and the New York Mountains.

4.8.3 PROJECT SITE CHARACTERISTICS

4.8.3.1 Scenic Quality

1. The project site is located in northern Lanfair Valley at the southern limits of the Castle Mountains. The site includes ridges, canyons, and alluvial slopes, with onsite elevations ranging from about 4,100 to 5,100 feet. The mountains are of volcanic origin. Exposed soils and rock outcrops vary in color from reddish-brown to nearly white. Blackbush scrub community vegetation cover is sparse over most of the mountain slopes. Vegetation density is greatest in the Joshua tree woodland/creosote bush scrub on the valley floor.

2. The proposed improvements for the Searchlight Access Route would occur on relatively flat and gently sloping alluvial plains at the western margin of Piute Valley and between the Castle and New York Mountains (see Figure 4.1.7, Searchlight Access Route Photographs). Creosote bush scrub vegetation on the floor of Piute Valley changes to a dense Joshua tree woodland at higher elevations near the northern Castle Mountains. Various unmaintained dirt roads lead to inactive and active mining claims in the area and to cattle ranching corrals and watering facilities. Portions of the former Barnwell and Searchlight Railroad grade are used as roads. Other portions, particularly where the grade was built in intermittent streambeds, have been washed away or otherwise abandoned for other preferred routes in the area.

3. Human modifications at the site are primarily a result of past and present mining activities. Access roads reach the site from the north and west and lead onsite to the location of the abandoned mining town of Hart, and to clay quarries. Other onsite roads lead to former mine workings or are related to exploratory drilling. The roads form distinct lines on the landscape, due to the lighter color of earth materials exposed below the surface. The clay quarries are the most intensive surface disturbing activities to date, both in size and in degree of color contrast. The most visually prominent clay pit is located on the west face of Big Chief Hill. Because the clay deposits are nearly white in color, they can be seen from locations over 15 miles away in Lanfair Valley (see Section 5.8 for viewpoints).

4. Human modifications along the proposed Searchlight Access Route include the bermed alignment of the former railroad, numerous unimproved jeep roads, and fencing, corrals, and water tanks associated with cattle grazing.

4.8.3.2 <u>Site Visibility</u>

1. Views of the proposed project site are confined to locations within Lanfair Valley. Views in the Valley from the north and east are generally restricted by the intervening topography of the Castle Mountains and its associated foothills and rock outcrops. However, distant views from the south, west, and northwest are available due to the site's location on the southwestern flank of the Castle Mountains (for viewpoints, see Section 5.8). From these directions, the topography allows some views of the southern Castle Mountains from distant locations in the Valley. Views of the southern Castle Mountains and proposed project site from Ivanpah

Road, Railroad Grade Road, and the East Mojave Heritage Trail are presented in Section 5.8. The proposed Searchlight Access Route is visible along the existing dirt road and when looking down from sites elevated above the valley floor.

2. Most public views of the southern Castle Mountains and proposed project site by visitors to Lanfair Valley are obtained from Ivanpah Road, which enters the Valley from the west (see Figure 5.8.2, Viewpoint No. 1 (Ivanpah Road)). Ivanpah Road is a rural, graded dirt road with traffic volumes of about 80 ADT east of Ivanpah, and about 50 ADT in Lanfair Valley (SBDOT, 1988). Other views by the general public can be obtained from unimproved dirt roads approaching the site. From the northwest, the site can be viewed from Railroad Grade Road, which traverses this portion of the Valley. From the south, the site is seen from unimproved roads such as those used for the East Mojave Heritage Trail (see Figure 5.8.4, Viewpoint No. 3 (East Mojave Heritage Trail)). No traffic counts are available for the Railroad Grade Road or the East Mojave Heritage Trail, but it is estimated that traffic volumes average less than 10 vehicles per day on these unimproved roads.

3. The project site is within viewing distance from two wilderness study areas (WSAs), as shown in Figure 4.10.2, Lanfair Valley Recreational, Environmental, and Wilderness Management Features. WSA 266 encompasses the northern New York Mountains, northwest of the site. The proposed project site is visible from selected ridgeline and southeast slope locations within this WSA where vegetation and topography do not impede views. The nearest viewpoints of the project site from WSA 266 are on lower alluvial slopes, about two miles distant. Views from these locations are similar to the view shown in Figure 5.8.3, Viewpoint No. 2 (Railroad Grade Road). WSA 267 encompasses the Piute Range and eastern slopes of the Castle Mountains. The project site is not readily visible from this WSA because these eastern slopes screen views from easterly directions, although distant views (over about four miles) are available from the central Piute Range.

4.9 CULTURAL RESOURCES

4.9.1 INTRODUCTION

1. Cultural resources are places or objects that are important for scientific, historic, and/or religious reasons to cultures, communities, groups, or individuals. Cultural resources include historic and prehistoric archaeological sites, architectural remains, structures, and artifacts that provide evidence of past human activity and places of importance in the traditions of societies or religions. Section 101 of the National Historic Preservation Act (NHPA) establishes procedures for determination of eligibility for listing historic and archaeological sites on the National Register of Historic Places (NRHP).

2. Prehistoric sites within the area of potential effect may contain artifacts, food remains, and features that could provide information on the kinds of prehistoric activities conducted at the sites, the numbers of people, and the dates of site occupation. This kind of information is important for an understanding of past lifeways, specifically the nature of aboriginal cultural adaptations in the arid eastern Mojave Desert region.

3. Historic sites may contain information that can aid in understanding the overall structure of industrial activities and the manner of individual enterprise in the Hart Mining District.

4. The following paragraphs describe the cultural baseline information as it is currently understood for the proposed Castle Mountain Project site and Searchlight Access Route. The information is a summary of data collected from previously prepared archaeological documents and surface inventories, augmented by a 1988 Class III surface inventory of an area encompassing the proposed project operations site and the proposed Searchlight Access Route.

5. The surface inventory was conducted primarily by archaeologists associated with the Archaeological Research Unit of the University of California, Riverside. Portions of the proposed Searchlight Access Route and several of the water well sites in the West Well Field were inventoried by archaeologists associated with Archaeological Research Services, Virginia City, Nevada. Details of the literature search and field inventories completed are contained in Wilke and Schroth (1988). A preliminary report has been submitted to the California and

Nevada State Historic Preservation Officers (SHPO). Submittal of the report is the first step in the consultation process with both the California and Nevada SHPOs required under Section 106 of the NHPA.

4.9.2 HISTORIC PERIOD

4.9.2.1 Regional History

1. Prior to the mid 19th century, Lanfair Valley served as a transportation route between the coastal areas of California and communities in the interior of the Desert Southwest. In the 1850s, the Mojave Road was built by the U.S. Army along the alignment of an ancient Indian trail. Small redoubts, or forts, were established by the Army along the trail near spring-fed water sources such as Piute Spring (Casebier, 1987). Regular mail and stage service were established in 1858, and the road remained in service until the 1880s, when it was supplanted by the railroads.

2. Active settlement of the region began in the second half of the 19th century and early part of the 20th century, with the advent of mining and farming activities. Various small mining operations and towns were established in the New York Mountains (e.g., Vanderbilt) and Castle Mountains (Hart), in Searchlight, Nevada, and at other locations within the region. Mining operations provided an incentive to extend railroad facilities northward from Goffs along the present alignment of Lanfair Road. The Nevada Southern Railroad was built to Barnwell, a town that served as a supply point for mining towns in the region. The railroad was later extended into the Ivanpah Valley as the California Eastern Railroad. A branch of this railroad, the Barnwell and Searchlight Railroad, was built between these two communities to serve mining operations in Searchlight. In the early 1920s, these lines were abandoned subsequent to the decline in mining and farming activities in the region and storm damage to rail facilities.

3. Cattle ranching was introduced into Lanfair Valley in the late 19th century, followed by dry farming in the first two decades of the 20th century. With the advent of homesteading and settlement of the Valley, small farm towns, including Lanfair, Dunbar, and Maruba were established at points along the alignment of the Nevada Southern Railroad (now Lanfair Road). Dry farming proved to be a short-lived activity, and by 1930 most homesteads, and the towns associated with them, had been abandoned. The comparatively large amount of privately owned land in Lanfair Valley is a reflection of past farming activities.

4.9.2.2 Site History

1. The town of Hart, located adjacent to the proposed Castle Mountain Project site, was one of several mining towns established around Lanfair Valley during the peak mining period. The town was founded in 1908 by James Hart and his mining partners after discovery of gold in the Castle Mountains. Mining began at the Oro Belle Mine and later expanded to include the Big Chief and Hart Consolidated mines.

2. During this period, Hart grew rapidly, numbering somewhere between 400 and 700 residents within months of its founding. An ore stamp mill was brought in from Nevada and constructed at the Big Chief Mine. Several businesses (hotels, taverns, and general stores), a post office, and a small cemetery were established.

3. Gold ores that could be economically mined were quickly exhausted. The 1910 Census listed only 40 residents of the town. During that same year, a fire destroyed half the town, most of which was not rebuilt and by 1920, Hart was described as a "ghost town." The Valley View mill, however, continued to be used occasionally into the 1940s. Two open-pit clay mining operations were established at the site in the 1920s and continue to operate intermittently.

4.9.2.3 Native Americans

1. Native American sociocultural values are reflected in their religious practices, which form an integral part of their culture and are intimately associated with and dependent upon the natural environment. A basic philosophy of tribal religion is to remain in a harmonious relationship with nature as participants in the ongoing process of creation. Native American religions embody a belief system in which interaction with the environment is holistic. They express reverence toward the total environment and consider specific places to be sacred.

2. Native American sociocultural values also are reflected in the importance attributed to plants and animals, objects, places, lifestyles, and beliefs and frequently are associated with the gathering and use of natural substances. These sociocultural values tend to be associated with three categories of locations identified by BLM:

- Traditional use areas
  - Currently or historically utilized for secular and subsistence activities, including the collection of foodstuffs, craft, medical and domestic materials, and hunting.
- Ritually associated localities
  - Includes seasonal non-locatable sites in areas related to ritual performance such as procreative and purification rites, and sources of ritual materials.
- Sacred areas
  - Includes areas of particular religious significance, such as burials, ceremonial sites, and areas employed for healing purposes.

3. None of these areas are known to exist within the Castle Mountains Project site or surrounding area.

4.9.3 PREHISTORY AND ARCHAEOLOGY

1. The earliest dated period of human occupation in the eastern Mojave Desert is presently established at 10,270 years before present (BP). This period is characterized by the Lake Mohave Complex, when the Soda and Silver playas were inundated by Pleistocene Lake Mohave following the last period of glaciation. The subsistence economy of the inhabitants at this time is thought to have been based on generalized hunting (BLM, 1988).

2. With the transition to a more arid and warmer climate following the Pleistocene, subsistence practices changed, and new cultures developed. The Pinto Complex (7,000 to 4,000 BP) saw the development of a more migratory society exploiting a number of environments, with a greater reliance on more diverse plant resources. The Gypsum Period (4,000 to 1,500 BP) marked the beginning of seed milling technology, selective gathering, and surplus stockpiling. Ceramics and turquoise mining were introduced into the area in the following Saratoga Springs Period (1,500 to 700 BP) (BLM, 1988).

3. The final period of human occupation in the eastern Mojave prior to Euro-American expansion was the Shoshonean Period (BLM, 1988). Southern Paiute groups had migrated southward, replacing the longstanding Mojave groups. The Chemehuevi, an offshoot of the Southern

Piute, occupied the Castle Mountain Project site in historic times (Wilke and Schroth, 1988). These groups were wide-ranging foragers, and many eventually settled on the Colorado River and adopted farming.

4.9.4 CULTURAL RESOURCES INVENTORY

1. A series of cultural resource inventories has been conducted for the proposed project. These include inventories for access roads, general reconnaissance of the project area, and specific inventories of:

   - Primary mine and heap leach recovery area
   - Southeast of the open pit mine and overburden area
   - North of the open pit mine area
   - Water well drill sites northwest of the project site
   - Searchlight Access Route
   - Monitoring well drill sites west of Piute Spring and 13 miles south of the project site

4.9.4.1 Proposed Searchlight Access Route

Prehistoric Period

1. A number of sites associated with prehistoric activities in the region were inventoried along the proposed Searchlight Access Route between the project operations area and the town of Searchlight, Nevada. Aboriginal sites that could be affected by the proposed access road include one multiple activity camp used for seed collecting and processing and food storage, as well as a quarry, where inhabitants reduced stone for tools from obsidian and chert/chalcedony sources.

Historic Period

1. The historic sites along the proposed access road alignment are associated with the former Barnwell and Searchlight Railroad. These sites include the grade of the former railroad and one site where material related to either construction or use of the railroad was discarded.

4.9.4.2 <u>Project Operations Area</u>

<u>Prehistoric Period</u>

1. Cultural resources inventories of the Castle Mountain Project vicinity demonstrated that the aboriginal inhabitants of the area actively mined the project site for resources to make tools and other artifacts. White chalcedony, chert, rhyolite, and jasper materials were exploited. These aboriginal sites contain significant information of value to research into understanding aboriginal tool stone quarrying and reduction activities.

<u>Historic Period</u>

1. Historic sites in the vicinity are related to the former town of Hart and associated gold mines and mill facilities. The mines and mill site have been studied and documented in detail through field mapping, photographic documentation, and archival research. Other sites include trash deposits outside the townsite and the local Hart water supply well.

2. The town of Hart contains a number of individual loci of potential historic significance, including several trash disposal loci and structural loci or foundations (including a storage bunker, the cemetery, and the main town access road). Although many of these have been disturbed by clay mining activities and artifact hunters, the overall site contains substantial information of research value for understanding the history of small "boom and bust" mining communities in the eastern Mojave Desert.

4.9.4.3 <u>West Well Field</u>

<u>Prehistoric Period</u>

1. No archaeological sites were identified within the proposed West Well Field northwest of the proposed project operations area.

<u>Historic Period</u>

1. No historic sites were identified within the proposed West Well Field northwest of the proposed project operations area.

4.10 LAND USE

4.10.1 LAND USE PLANS AND POLICIES

1. The proposed Castle Mountain Project must comply with a number of Federal, State, and San Bernardino County policies and regulations addressing surface mining operations. Two agencies, BLM and the San Bernardino County Planning Department, are responsible for reviewing and approving overall mining operations at the Castle Mountain Project site. Other Federal, State, regional, and local agencies have permit authority over specific components of the proposed mining operations.

2. The majority of the land potentially affected by the proposed Castle Mountain Project is Federally owned and is administered by BLM. Mining operations on open Federal lands are managed pursuant to the General Mining Law of 1872 and the Federal Land Policy and Management Act (FLPMA) of 1976. As a locatable mineral, the mining of gold on open Federal land is authorized by the General Mining Law of 1872 and, therefore, is an activity over which BLM does not have discretionary authority. The Code of Federal Regulations (that implement FLPMA), however, define specific procedural measures and environmental standards that mining operations must comply with to prevent "unnecessary or undue degradation" of Federal lands (43 CFR 3809, Surface Management). In areas where specific statutory authority requires that a stated level of environmental protection or reclamation be attained, such as the California Desert Conservation Area (CDCA), that level of protection must be met. No mining operation under Federal mining regulations can be denied unless it is demonstrated that the operation has not complied with applicable regulations. Certain mining-related activities such as water pipeline and powerline routes outside the area of operation require rights-of-way authorization and must be in the public interest before such activities can be approved.

3. San Bernardino County has regulatory authority over unincorporated land not directly regulated by State and Federal government agencies or Indian tribes. Although the County does not regulate the use of Federal land, it is the designated Lead agency responsible for implementing the California Surface Mining and Reclamation Act (SMARA) of 1975 which applies to mining operations on Federal land within the State of California. Through the framework of the General Plan, the County also provides additional information and guidance that can be used by other agencies to coordinate land use decisions.

4.10.1.1. Bureau of Land Management

California Desert Conservation Area Plan (1980)

1. The CDCA encompasses an area of about 25.5 million acres. The CDCA Plan applies to 12.1 million acres of Federal lands administered by BLM in southeastern California, as shown in Figure 4.10.1, California Desert Conservation Area. The Plan was prepared pursuant to a congressional mandate in FLPMA. The main purpose of the Plan is to protect and enhance the desert environment, while providing for the use of public lands within a multiple-use framework. This framework attempts to balance the frequently conflicting interests of the various users of the desert. All uses within a planning area must conform to the approved land use, which in this case is the CDCA Plan incorporating multiple land uses.

2. The principal feature of the Plan is the multiple-use classifications that have been applied to all Federal lands within the CDCA. The plan establishes four multiple-use classes: C - Controlled (the most restrictive), L - Limited, M - Moderate, and I - Intensive (the least restrictive). The Plan identifies 19 general land use or resource management activities to be managed within the CDCA, including vegetation, livestock grazing, mineral exploration and development, recreation, and wildlife species and habitat. Specific guidelines for each of these activities are defined for the four multiple-use classes.

3. The Multiple-Use Class C designation applies to areas which have been preliminarily recommended as suitable for wilderness designation. These areas are currently managed under Class L Guidelines, or Interim Management Policy (IMP) and Guidelines for Lands Under Wilderness Review, whichever are stricter. Final management decisions for this class will depend upon congressional legislation. Class C covers 16 percent of BLM lands in the CDCA.

4. The Multiple-Use Class L (Limited Use) designation has been applied to nearly 50 percent of BLM managed land within the CDCA, including the proposed Castle Mountain Project site, most of the Castle Mountains, and Lanfair Valley. This designation generally limits activities to "lower-intensity, carefully controlled multiple use of resources" to protect sensitive, natural, scenic, ecological, and cultural resource values. Mining and mineral exploration uses are permitted in Class L areas, subject to 43 CFR 3809 Regulations, and applicable State and local law.

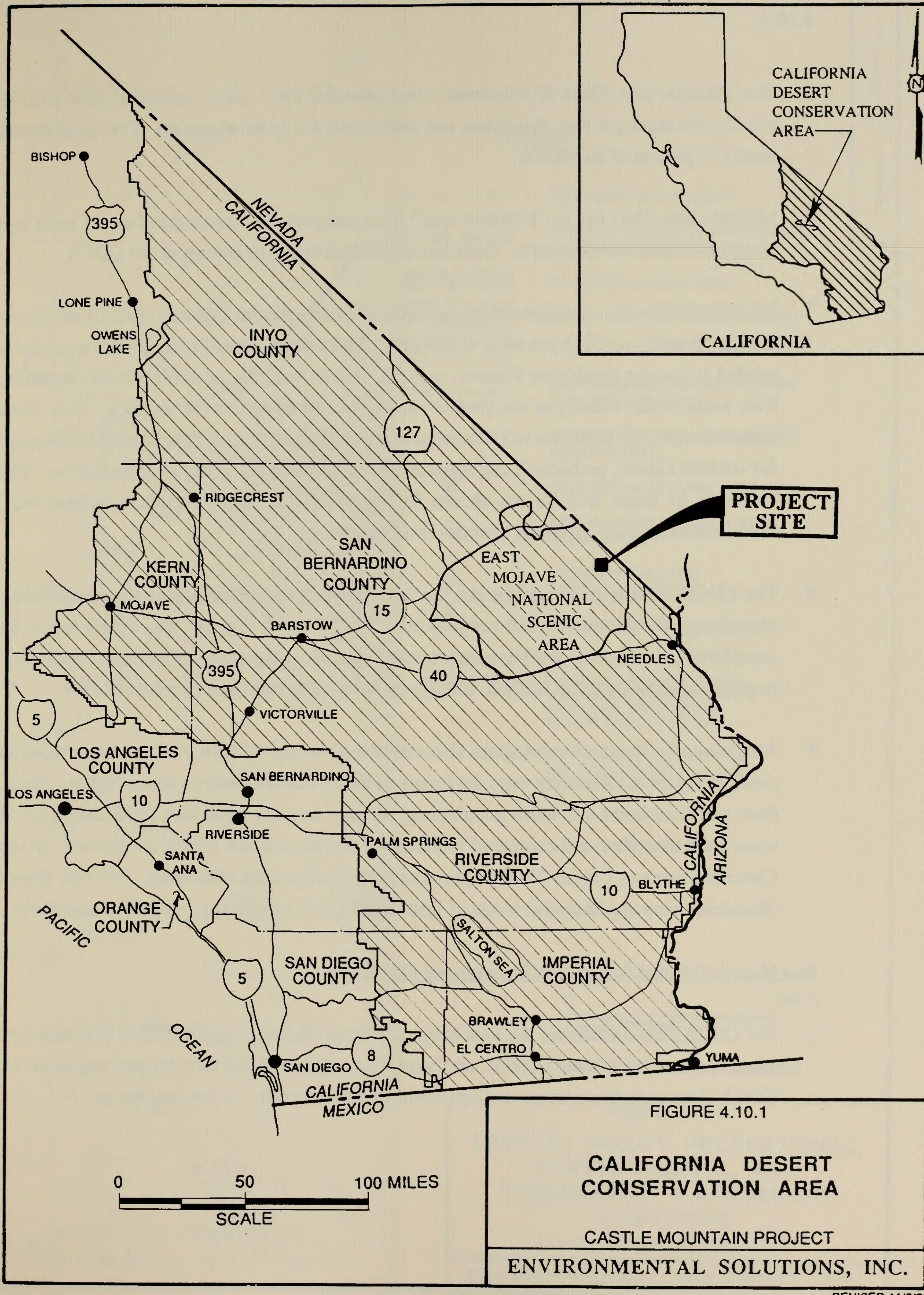

FIGURE 4.10.1

CALIFORNIA DESERT CONSERVATION AREA

CASTLE MOUNTAIN PROJECT

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5. The Multiple-Use Class M (Moderate Use) provides for a wide variety of uses such as mining, livestock grazing, recreation, and energy and utility development. This class covers nearly 30 percent of the CDCA.

6. Multiple-Use Class I is an "Intensive Use" class designed for concentrated use of lands and resources to meet human needs. This class covers less than five percent of the CDCA.

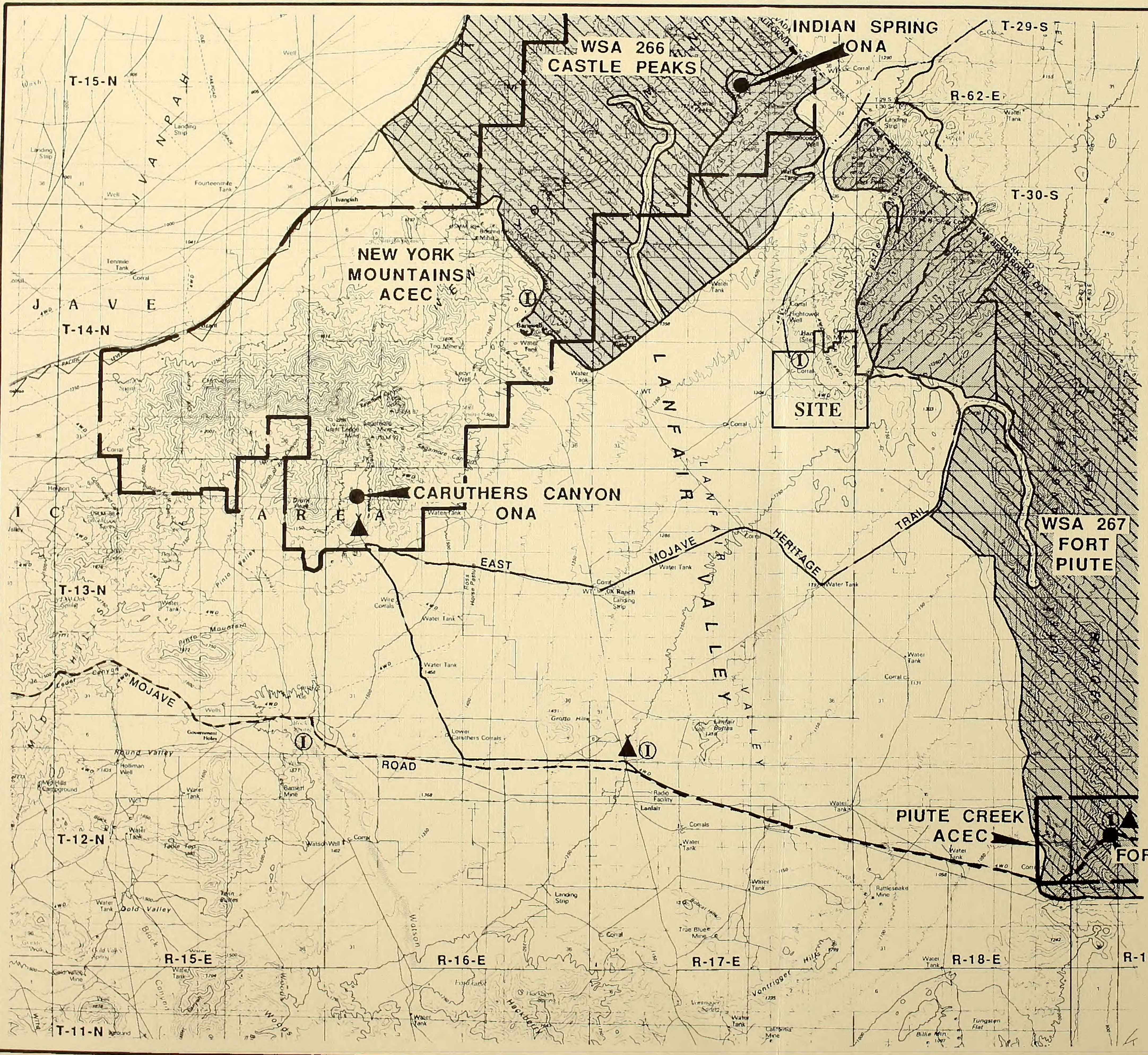
7. The CDCA Plan also designates Areas of Critical Environmental Concern (ACEC) within the CDCA. Identified ACECs are areas within public lands where special management attention is needed to protect significant historic, cultural, scenic, wildlife, or other natural resources. Two areas in the vicinity of the project site have been designated as ACECs: New York Mountains (54,750 acres) for wildlife habitat and scenic quality; and Piute Creek (4,175 acres) for wildlife habitat, prehistoric and historic values, scenic quality, and riparian habitat. The locations of these ACECs are shown in Figure 4.10.2, Lanfair Valley Recreational, Environmental, and Wilderness Management Features.

8. The CDCA Plan also recognizes the Lanfair Valley desert grassland as an unusual plant assemblage (UPA) because its range within the CDCA is limited. The UPAs are to be considered in reviewing development proposals that may potentially impact these resources. Impacts to UPAs are to be avoided, when possible, or mitigated through rehabilitation.

9. Allotments for livestock grazing are also established within the CDCA Plan. Considered in establishing these allotments were the forage needs of wildlife, such as desert bighorn sheep, deer, and feral horse and burro populations. Forage carrying capacities for BLM's grazing areas were identified and compared to historical use to establish forage allocations. In the Crescent Peak and Lanfair Valley ephemeral/perennial grazing allotments, livestock forage allocations were established at levels of 1,560 and 12,168 Animal Unit Months, respectively.

<u>East Mojave National Scenic Area Management Plan (1988)</u>

1. The CDCA Plan established the East Mojave National Scenic Area (EMNSA) to encompass the unique natural, cultural, scenic, and recreational values of the East Mojave region of the CDCA. The recommendation was approved by the Secretary of the Interior in 1981. The



LEGEND

- PROPOSED ACCESS ROAD
- AREAS OF CRITICAL ENVIRONMENTAL CONCERN (ACEC) BOUNDARY
- WILDERNESS STUDY AREA
- BLM SUITABLY RECOMMENDED WSA
- BLM RECOMMENDED AS UNSUITABLE
- PROPOSED NATIONAL RECREATION TRAIL (MOJAVE ROAD)
- INTERPRETIVE TRAIL (EAST MOJAVE HERITAGE TRAIL)
- OUTSTANDING NATURAL AREA (ONA)
- EAST MOJAVE NATIONAL SCENIC AREA BOUNDARY
- VISITOR INFORMATION INTERPRETIVE SITES
- PRIMITIVE CAMPING AREAS

BASE REFERENCE: U.S.G.S. 30 x 60 MINUTE SERIES TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA, AND DAVIS DAM, NEVADA, BOTH DATED 1985

SOURCE: EAST MOJAVE NATIONAL SCENIC AREA MANAGEMENT PLAN 1988

0 2 4 MILES

SCALE

CONTOUR INTERVAL: 50 METERS

FIGURE 4.10.2

LANFAIR VALLEY RECREATIONAL, ENVIRONMENTAL, AND WILDERNESS MANAGEMENT FEATURES

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Scenic Area encompasses 1.3 million acres of BLM administered land, or about 10 percent of the 12.1 million acres of BLM managed land in the CDCA (see Figure 4.10.1). A management plan was authorized, as a supplement to the CDCA Plan, to address the public land management needs of this region.

2. In 1981, a management philosophy statement was prepared with public assistance to provide specific guidance for management of the Scenic Area. The goals and objectives of this statement were incorporated into the EMNSA Plan, which was approved in September 1988 by the BLM Needles office. Six management goals were adopted to direct future decisions for multiple use of the resources of the 1.5 million-acre Scenic Area:

   - Make the region a demonstration showcase for multiple-use management.
   - Assure retention of the balance between use and natural values.
   - Provide for public enjoyment and understanding of the region, its history, and natural features.
   - Limit the region's "development" in the sense of more paved roads and large campgrounds on public lands; yet provide improved services and information, and enhance resource values by adding appropriate improvements, such as water.
   - Stabilize and, as appropriate, rehabilitate or recreate important historic structures.
   - Manage visitor uses in a manner that encourages dispersion so as to maintain the region's character and scenic values, as well as to protect resources.

3. Mineral development is one of 12 land use and resource management issues addressed by the EMNSA Plan. The Plan recognizes the need to balance mineral development in the Scenic Area with protection of environmental and scenic resources. The EMNSA Plan states the following as an objective to resolve this issue:

   - Encourage mineral development consistent with the principles developed in the National Mineral Policy and Development Act of 1970, and in a manner to prevent unnecessary or undue degradation of public lands.

   The EMNSA Plan supports continued mineral development within the East Mojave Desert as an extension of long-standing activity that has helped to define the character of the area. Mining operations are to be designed to be as visually unobtrusive as best practices allow in order to help protect the scenic integrity of the EMNSA.

4. The recreation management element of the EMNSA Plan also establishes a number of measures to accommodate the growing recreational activity in the area. The objective is to

maintain the present emphasis on dispersed, casual recreational uses and activities which require few facility improvements, services, and controls. The BLM support would focus on the development of an interpretive plan for the EMNSA that would identify sites, trails, and other features that are important to the area's cultural and natural history, as well as man's interaction with the resources of the area. The Plan supports two off-road vehicle trails, the Mojave Road and the East Mojave Heritage Trail (shown in Figure 4.10.2) that have been established in the area by a volunteer organization, and it proposes the Mojave Road for designation as a National Recreational Trail. The development of additional interpretive trails and supporting primitive camping facilities for users of the trails and other attractions in the area is proposed in the EMNSA Plan. Figure 4.10.2 also identifies a number of existing and proposed trails, interpretive sites, and camping areas within the general Lanfair Valley area.

4. Approximately 50 percent of the EMNSA has been designated as wilderness study areas (WSAs) pursuant to Section 603 of FLPMA. The purpose of the wilderness program is to identify areas that have remained in an essentially natural state for inclusion in the National Wilderness Preservation System, which would preserve these areas for the enjoyment of future generations. The EMNSA Plan addresses measures to protect 23 WSAs (seven WSAs recommended by BLM as suitable and 16 recommended by BLM as unsuitable for wilderness designation) until Congress takes final action on BLM's recommendations. Prior to a decision by Congress, surface disturbing activities within WSAs are reviewed for compliance with the nonimpairment criteria established by the Interim Management Policy and Guidelines (IMP) for Wilderness Review (BLM, 1987). The BLM's actions include posting signs and increasing surveillance and monitoring of these areas.

6. Although activities such as mining are not precluded from WSAs, all surface-disturbing activities are reviewed for compliance with the nonimpairment criteria established by the IMP in the CDCA Plan, as follows:

- The use must be temporary.
- Any temporary impacts caused by the activity must, at a minimum, be capable of being reclaimed to a condition of being substantially unnoticeable in the WSA.
- At the conclusion of the activity and site reclamation, the area's wilderness values must not have been degraded to the point that significantly constrains the recommendation of the area's suitability or nonsuitability for preservation as wilderness (based on naturalness, outstanding opportunities for solitude or primitive and unconfined recreation, ecological, geological, or other features of scientific, educational, scenic, or historical value).

No portion of the proposed Castle Mountain Project is located within a WSA.

7. Visual resource management policies are included in the EMNSA Plan to help maintain or improve the existing scenic character of the region. Non-discretionary activities such as mining are to be designed to be as visually unobtrusive as "best practices" allow. Projects that disturb more than five acres or are proposed in areas of high visual sensitivity require the preparation of visual simulations to identify probable visual impacts. These potential impacts are specifically evaluated for the Castle Mountain Project in Section 5.8, Visual Resources, of this document.

4.10.1.2 County of San Bernardino

1. The County of San Bernardino General Plan, adopted in 1979, recognizes mineral resources as an integral part of the development and economy of the County. The mineral resource section of the General Plan was revised in 1986 to include mineral resource zone designations by the California State Geologist. The General Plan recognizes that the location of mineral resources and mining operations is controlled by naturally occurring geologic conditions. General Plan goals support development and extraction of mineral deposits and the reclamation of mined lands. Policies are included to identify significant mineral resource lands and to protect these lands from encroaching incompatible land uses and activities.

2. San Bernardino County General Plan policies support the development of mineral resources in a manner that minimizes disturbance to the environment. County-wide policies allow mineral resource extraction and processing operations, but also require mineral lands to be reclaimed for uses that improve the residual environment and protect public health and safety. For projects on Federal lands, the County's responsibility is primarily for implementation of the SMARA.

3. The proposed Castle Mountain Project is located in the desert subarea as defined by the General Plan. Desert land use policies encourage uses compatible with the open, rural character (e.g. ranching, agriculture, mining) of the desert environment. Such uses include activities which improve the economic base of the desert, such as agriculture, recreation, tourism, and mineral extraction.

4. The Castle Mountains, including the proposed project site, are delineated as a Mineral Resource Zone 2 area. This designation implements the system used by the California State

Geologist to classify and designate lands where adequate information indicates that significant minerals are present, or where it is judged that a high likelihood for their presence exists.

4.10.2 REGIONAL LAND USE

4.10.2.1 General

1. Low density land use activities prevail in the desert areas of eastern San Bernardino County and in adjacent southern Clark County, Nevada. Livestock grazing is the most widespread use in the region, although mining, recreation/tourism, and open space uses are also common, especially within the EMNSA. Transportation and transmission facilities, including interstate and State highways and County and local roads, railroads, power transmission lines, utility pipelines, and communication stations, are also located throughout the region.

2. Small communities are scattered throughout this region of the Mojave Desert. For the most part, these communities are closely tied to major transportation corridors, such as Interstate 15, Interstate 40, and the Union Pacific and Southern Pacific Railroads. Towns such as Baker provide services to highway travelers, while long-established railroad and trade/service centers for the surrounding desert region (e.g. Nipton) continue to perform these functions. Many of these communities are becoming increasingly tourist oriented as historical sources of income dwindle. Particularly in Nevada, many desert towns, such as Laughlin, have grown because of tourist-oriented gambling, and as retirement communities. Aside from these, scattered residential uses on privately owned lands also are common.

4.10.2.2 Mining

1. Mining has been a continuous activity in eastern San Bernardino County and southern Clark County for the past century. Much of the early impetus for settlement and the extension of railroads into this area occurred in response to mining activity. Many existing and former towns were founded as mining communities, including Searchlight and Crescent in Nevada, and Hart and Ivanpah in California. Most of these communities tended to be short-lived, quickly exhausting the small deposits of high-grade gold ore upon which they depended, that

could economically be mined given the technology at that time. The number of abandoned mine workings in the hills and mountains encircling Lanfair Valley attest to the past importance of gold mining in the region.

2. After the decline of gold and silver mining in the early 20th century, mining activity focused on other types of ore and minerals. Operations within the EMNSA turned to cinder mines, a sericite mine, and clay mines including clay mining presently conducted at the proposed project site. Active mining interest in the East Mojave is reflected in over 10,000 mining claims throughout the EMNSA, representing approximately seven percent of the total mining claims in the State of California (BLM, 1988). The greatest concentrations of EMNSA mining claims occur in the Providence, New York, and Clark Mountains, the Ivanpah/Mescal Range, and the Hart Mining District.

3. Changing technology has caused a resurgence of interest in reopening gold mines previously abandoned as uneconomic. Recently, two such gold deposits have resumed production using open pit mining technology. These operations are located in the Clark (New Colosseum mine) and Ivanpah (Morningstar mine) Mountains northwest of the Castle Mountain Project site. Since 1980, a number of other operations using open pit and heap leach mining processes have been established in other desert regions of southern California and Nevada.

4.10.2.3 <u>Grazing</u>

1. Grazing is another East Mojave land use that has been practiced since the end of the 19th century, with the earliest operation beginning in Lanfair Valley. Over 90 percent of the EMNSA is part of BLM livestock grazing allotments. Likewise, the dominant land use on BLM land in southern Clark County is cattle grazing.

2. Grazing in these areas is year-round, with private ranchers and BLM sharing ownership of most range improvements. Facilities consist of scattered corrals, windmills, wells, pipelines, stock tanks, and fences. To maintain productive rangeland and protect wildlife species and habitat, BLM manages livestock grazing as provided for in Allotment Management Plans, which facilitate changes in response to varying range conditions. The Lanfair Valley and Crescent Peak allotments are located in the region of the Castle Mountain Project site, as shown in Figure 4.10.3, BLM Grazing Allotments.

4.10.2.4 Recreation

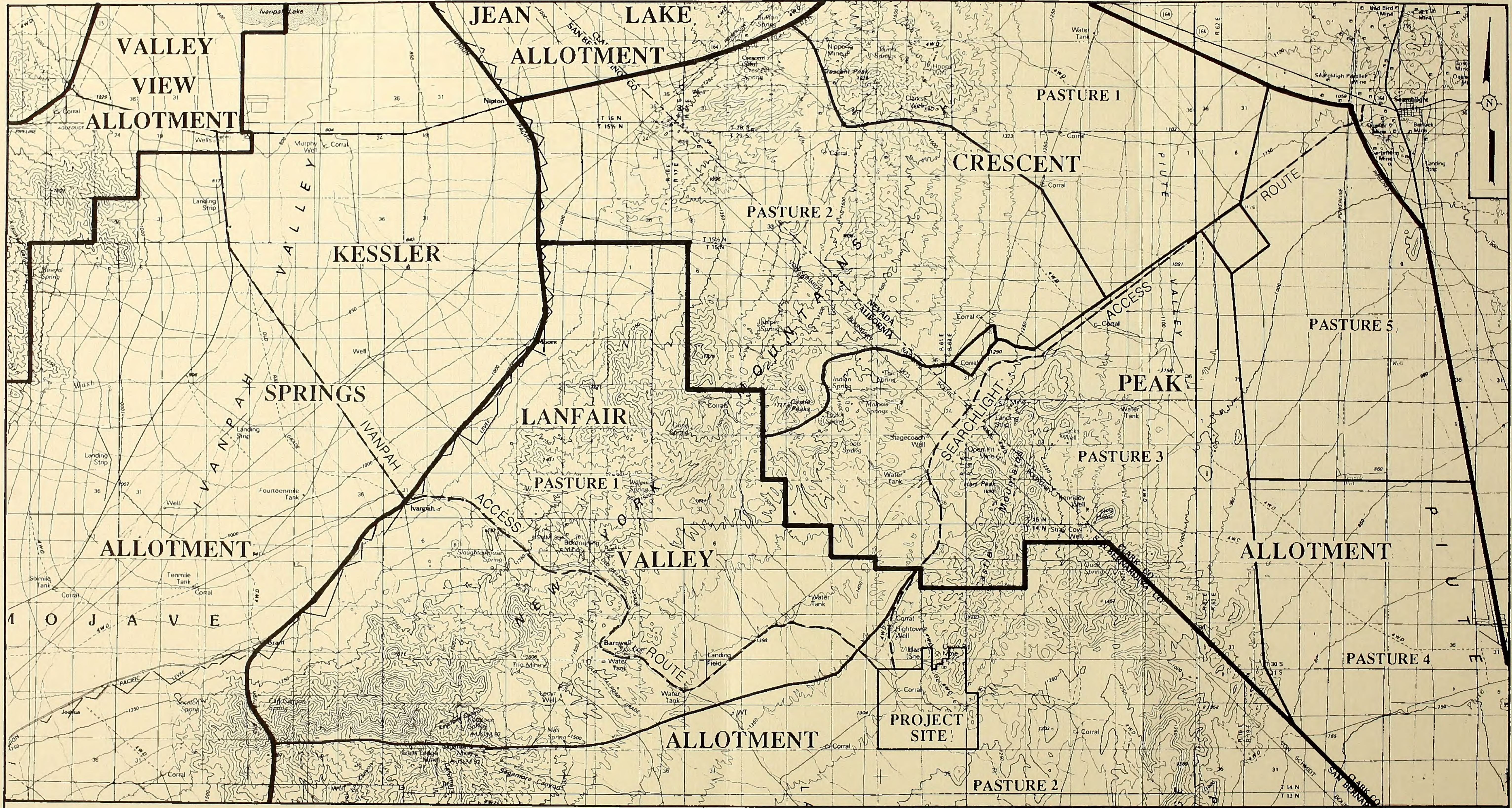
1. The eastern Mojave Desert has become an increasingly important recreation area serving the growing population centers of southern California and southern Nevada. Recreation use in the EMNSA is somewhat less than in other parts of the California Desert and is dispersed over a large area (BLM, 1988). The EMNSA presently receives an estimated 75,000 recreational visitors a year, a number which is expected to increase to over 200,000 in the next 10 years (BLM, 1988).

2. The BLM recreation management in the East Mojave has emphasized information and interpretation through the use of maps, brochures, and other publications. These materials provide visitors with the information needed for self-guided recreational activities and maintain the predominant casual use orientation of recreational activities. The BLM has supported the efforts of a volunteer group to establish guides for two ORV tour routes in the region: the Mojave Road and the East Mojave Heritage Trail. These trails have been incorporated into the EMNSA Plan. The locations of these trails in Lanfair Valley are depicted in Figure 4.10.2.

3. Recreational activities primarily involve casual use, oriented toward the observation and enjoyment of the area's scenery and natural or historic resources. Activities include off-highway vehicle touring, sightseeing, hiking, birdwatching, and rock collecting. The Searchlight Access Route provides ingress and egress for a variety of recreational activities, including small game hunting, ORV touring, sightseeing, and dispersed camping. In addition, the Nevada portion of road is also a focal point for a number of motorcycle events in the area. These activities have not required major improvements for recreational purposes, as existing roads and trails are the primary "facilities" associated with these activities. Improved facilities, even relatively primitive campgrounds, are rare.

4.10.2.5 Wilderness Areas

1. Two of the seven wilderness study areas in the EMNSA that are recommended by BLM as suitable for preservation as wilderness are located in the Lanfair Valley region. As shown in Figure 4.10.2, Castle Peaks (WSA 266) and Fort Piute (WSA 267) are located on the northern and eastern perimeters of the Valley.



0 1 2 3 4 MILES

SCALE

CONTOUR INTERVAL: 50 METERS

FIGURE 4.10.3

BLM GRAZING ALLOTMENTS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REFERENCE: 30 x 60 MIN. U.S.G.S. TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA-NEVADA, AND DAVIS DAM, ARIZONA-NEVADA DATED 1985 AND 1982, RESPECTIVELY

REVISED 11/11/88

4.10.3 PROJECT SITE LAND USE

4.10.3.1 Mining

1. Considerable evidence of past and present mining activity exists at the Castle Mountain Project site. Remnants of the mine works and mining town of Hart, including mine adits, the ruins of head frames and milling facilities, and other mining structures can be seen. Two clay pits are located on or proximal to the site. The clay mined from these pits is used for the manufacture of ceramic materials. An office trailer and access roadways associated with the Applicant's ore delineation program are also evident.

4.10.3.2 Grazing

1. The proposed Castle Mountain Project site is located within BLM's Lanfair Valley allotment. The proposed Searchlight Access Route passes through the Crescent Peak grazing allotment. These allotments are depicted in Figure 4.10.3. The range condition of both allotments is considered to be good.

2. The Lanfair Valley allotment encompasses about 470,000 acres, 75 percent being Federal (BLM) land. The allotment is divided into five pastures, among which livestock are rotated during the year to maintain productive rangeland. The proposed mining area is located in Pasture 2, while the West Well Field and part of the Searchlight Access Route are sited in Pasture 1. The allotment has an estimated capacity of 15,600 AUMs, and an authorized use of about 12,160 AUMs.

3. The Crescent Peak grazing allotment comprises approximately 151,000 acres. This allotment also has five pastures and lies in both Nevada and California. A portion of the proposed Searchlight Access Route (including Clark County Road A68P southwest of Searchlight) is located within this allotment. The local rancher leasing the allotment has reported that several incidents involving collisions between vehicles and his cattle have occurred over the last two years along County Road A68P. There is fencing along one side of the road, but not along the entire distance of the road.

4.10.3.3 Recreation

1. Recreational use at the Castle Mountain Project site is expected to primarily involve informal uses such as sightseeing. The remains of past mining activities at Hart attract sightseers, rockhounds, and other recreationists. Shooting and hunting also may occur in and around the proposed site.

2. The Hart townsite and mining history are referenced in the East Mojave Heritage Trail guide-book, which is available to off-highway vehicle recreationists. This trail traverses Lanfair Valley and continues from south to north along the eastern edge of the Castle Mountains until linking with Clark County Road A68P near the California/Nevada State Line (see Figure 4.10.3).

4.10.3.4 Wilderness Areas

1. No portion of the proposed Castle Mountain Project site is within an area designated as a WSA. Portions of WSAs 266 and 267 closest to the Searchlight Access Route have been recommended by BLM as unsuitable for wilderness designation. The Searchlight Access Route would not encroach into these areas.

4.11 SOCIOECONOMICS

1. The discussion of Socioeconomics in this report describes the employment, population, and housing characteristics of the region which would be affected by the proposed Castle Mountain Project, shown in Figure 4.11.1, Socioeconomic Study Areas. Most information on current socioeconomic conditions is available only for large regions, such as counties and metropolitan statistical areas (MSA), which usually have a large but integrated economy. Since the Castle Mountain Project site is located near the California/Nevada border, information on the Las Vegas, Nevada MSA (Clark County) and the Riverside-San Bernardino MSA (Riverside and San Bernardino Counties) are used in this report.

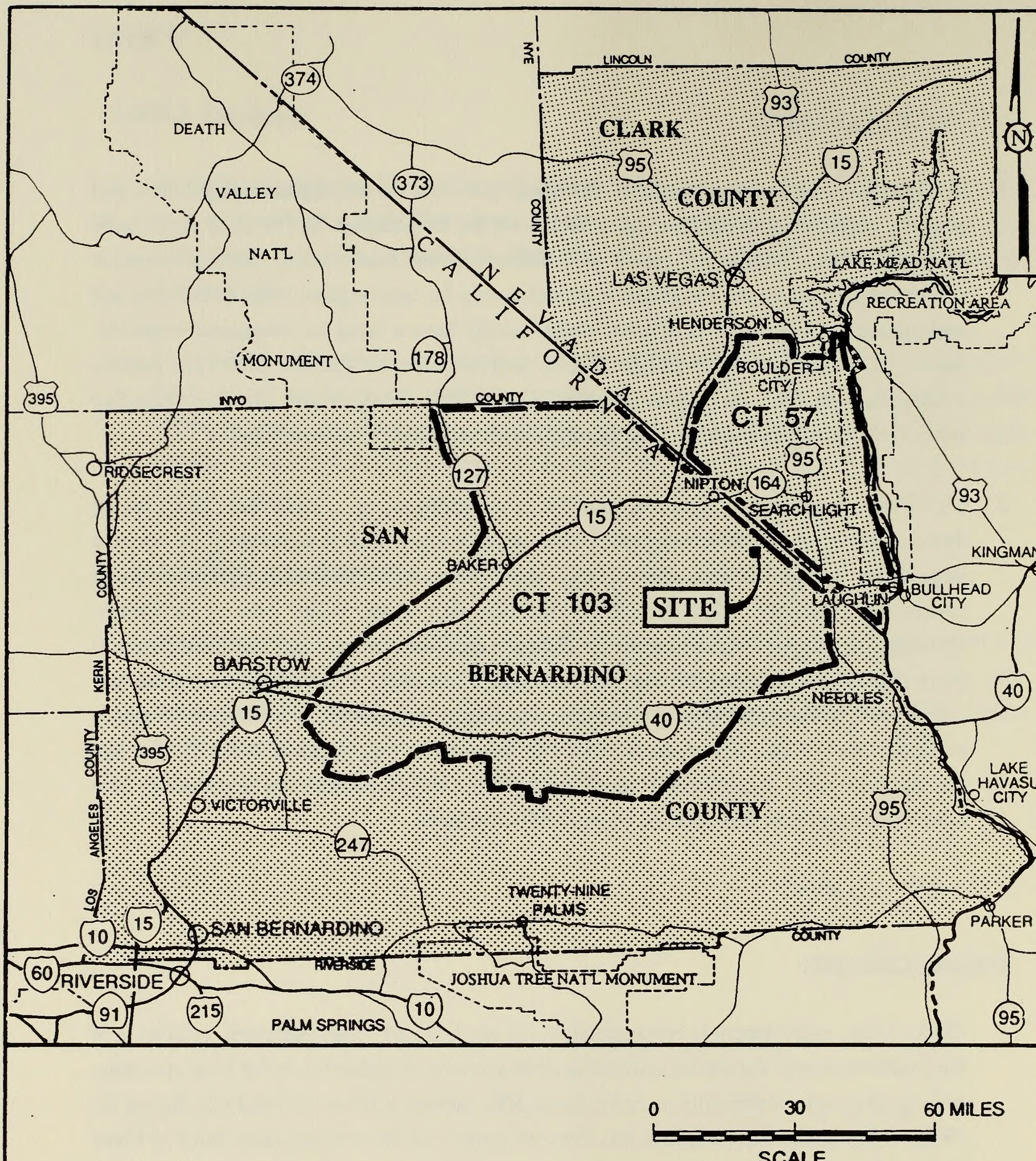
2. Significant economic, population, and housing conditions at a local level may not be distinguishable using information at the county or MSA level. This is particularly the case in a large region such as San Bernardino County where county-wide information generally reflects conditions in the City of San Bernardino area (identified as the Valley Area by the County Planning Department) where most of the County's population is located. The Valley Area is more than 100 miles from the east Mojave region, and its jobs and services are generally inaccessible to desert residents. Therefore, the limited socioeconomic information that is available for the two desert areas adjoining the project site (Census Tract 103 in San Bernardino County and Census Tract 57 in Clark County) is presented to help identify how these areas may differ from general county-wide conditions.

4.11.1 EMPLOYMENT

Regional Employment

1. Clark County employment is concentrated in the services and trades industries, indicative of the predominance of the tourist-oriented gambling and resort industries in the local economy. Mining employment presently numbers about 300, varying between 300 and 600 during the 1980s. Mining currently employs less than one percent of the working labor force in Clark County.

2. In the Riverside-San Bernardino region, employment is more diversified, with services, trades, government, and manufacturing being important sources of employment for the local labor force. In 1987, mining employment numbered about 1,200 in the two-county region, less than half the 1979 number. The reduction of mining employment principally occurred



LEGEND

CT 103 CENSUS TRACT 103

CT 57 CENSUS TRACT 57

FIGURE 4.11.1

SOCIOECONOMIC STUDY AREAS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 11/8/88

from 1979 to 1983, decreasing from 2,600 to 1,200. Closure of major mining operations, such as the Eagle Mountain iron ore mine in Riverside County, is the principal factor in this decline. The opening of gold mining operations in the eastern Mojave during the 1980s has helped stabilize mining employment. Since 1982, mining employment in the two-county region has ranged between 1,200 and 1,300 (CEDD, 1988).

3. Labor force information is useful in identifying how the local desert economies in both San Bernardino and Clark Counties differ from county-wide conditions, particularly with respect to the mining industry. Mining is an industry that employs a high proportion of persons in skilled blue-collar occupations: equipment operators, precision production workers, craftsmen, and similar occupations. As shown in Table 4.11.1, Labor Force Occupational Characteristics, a greater proportion of the local labor force in the desert communities in both San Bernardino and Clark Counties is employed in skilled occupations than is the county-wide labor force. These data imply that industries such as mining are important sources of employment for these local areas, particularly the desert region of eastern San Bernardino County. Other than mining employment, most workers in the desert are employed in industries such as tourism, highway trade and services or, in the case of southern Clark County, the gambling industry.

Local Employment

1. Few jobs are presently available at the Castle Mountain Project site or adjoining areas of Lanfair Valley. Clay mining is an occasional activity, performed by persons who are regularly employed elsewhere. There also is some employment in the livestock industry.

4.11.2 POPULATION

Regional Population

1. The current population of San Bernardino County is estimated to be 1,240,000 (USBC, 1983b). Approximately 75 percent is located south of the San Bernardino Mountains in the South Coast basin. A second concentration of population (13 percent) occurs in the desert around Victorville/Apple Valley and Barstow.

TABLE 4.11.1

LABOR FORCE OCCUPATIONAL CHARACTERISTICS

LABOR CATEGORY	SAN BERNARDINO COUNTY (Percent)	CENSUS TRACT[5] 103 (Percent)	CLARK COUNTY (Percent)	CENSUS TRACT[5] 57 (Percent)
Skilled occupations[1]	32.3	41.3	20.6	25.6
Service occupations[2]	12.3	16.4	29.8	27.4
Technical, support, clerical occupations[3]	30.3	18.3	29.4	22.6
Professional, managerial occupations[4]	21.5	11.3	19.3	19.3
Other	3.6	12.7	0.9	5.1
TOTAL	100	100	100	100

Notes: (1) Includes craftsmen, equipment operators, and precision production work.
(2) Includes food handlers and domestics.
(3) Includes secretaries and store sales clerks.
(4) Includes doctors, lawyers, and corporate managers.
(5) See Figure 4.11.1 for census tract locations.

Source: U.S. Bureau of the Census 1983a,b.

2. The remaining San Bernardino County population, about 10 percent of the total, is located in relatively small communities dispersed through the desert and mountain areas. In the East Mojave region, these communities tend to be found at points along major transportation routes. The town of Baker is the largest, with an estimated population of 650 persons. Most of the remaining settlements range from 25 to 100 residents. Census Tract 103, which encompasses most of the East Mojave, including the project site, had an estimated 3,700 persons in 1985, less than 0.5 percent of the County total. Population increase in the East Mojave since 1980 has occurred at a rate comparable to County-wide trends, approximately 20 percent.

3. The population of Clark County, Nevada, is presently estimated at about 665,000 persons (USBC, 1983a). This population is concentrated in the Las Vegas valley where the City of Las Vegas, Nevada's largest city, and its incorporated and unincorporated suburbs are located. Approximately 95 percent of the County's residents are located in the region from Las Vegas to Boulder City. Southern Clark County has about 3,600 residents, primarily in Laughlin (2,700) and Searchlight (575). Population in southern Clark County has increased threefold since 1980, attributable primarily to the planned development of Laughlin as a gambling resort on the Colorado River. Exclusive of Laughlin, population in the remainder of southern Clark County decreased from 990 to 840 persons during this same period (Clark County, 1988a).

4. General population characteristics also tend to differentiate the desert communities from the remainder of the metropolitan regions, as shown in Table 4.11.2, Characteristics of the Study Area Population. The desert population tends to be older, have smaller household sizes, lower household incomes, higher rates of poverty, and higher unemployment than the general metropolitan communities. A contributing factor to these differences is the more limited employment in the desert areas, which may encourage younger persons entering the labor force to move elsewhere for jobs. Southern Clark County also has a relatively large retirement age community compared to the other areas.

Local Population

1. The Castle Mountain Project site and the surrounding EMNSA are located within a region that has been referred to as the "Lonesome Triangle," since the permanent resident population of about 500 persons (BLM, 1988), is scattered among a number of small villages, ranches, and rural residences throughout the area. There is no resident population at the project site. The

TABLE 4.11.2

CHARACTERISTICS OF THE STUDY AREA POPULATION

CHARACTERISTICS	LOCATION			
	SAN BERNARDINO COUNTY (1)	CENSUS TRACT 103(1)	CLARK COUNTY	CENSUS TRACT 57(2)
Population Total				
1987	1,058,998	3,692	664,189	3,555
1980	895,016	3,061	463,087	1,082
Percent Change	18%	21%	43%	229%
Median Age	28.3	32.4	29.6	37.4
Median Household Income	$17,463	$16,055	$22,899	$12,768
Below Poverty Level				
Percent of families	9.1	11.4	6.7	10.8
Percent of persons	11.1	13.7	9.1	12.1
Percent Unemployed	7.4	7.6	6.4	12.4

(1) San Bernardino County and Tract 103 Population Total for 1985 and 1980, respectively.
(2) Increase attributed to Laughlin development: 1980 population = 92; 1987 population = 2,718.

Source: U.S. Bureau of the Census 1983a,b.

dwellings closest to the site in Lanfair Valley are located at the Barnwell site on Ivanpah Road, and at the headquarters of the OX ranch, both of which are approximately eight miles distant.

4.11.3 HOUSING

Regional Housing

1. Most housing resources in the desert region are concentrated in the small desert communities and villages. A few dwellings, usually associated with ranch operations, are scattered throughout this region.

2. Housing characteristics in desert communities differ from those of the housing markets in the general County regions, as shown in Table 4.11.3, Selected Housing Characteristics. Vacancy rates in southern Clark County and eastern San Bernardino County tend to be twice as high as the overall County rates. This difference is attributed, in part, to the number of units held for occasional occupancy, such as second homes, which are also higher in these areas (exclusive of the San Bernardino Mountain resort communities). Housing values and costs are lower in the desert communities, reflecting lower land costs and a high proportion of lower cost housing types, particularly mobile homes. Mobile homes are an important component of desert housing, comprising approximately one-third of the housing in eastern San Bernardino County and three-fourths of southern Clark County housing.

3. The type of housing available in southern Clark County has changed somewhat during the 1980s as a consequence of the development of a gambling resort at Laughlin. Development in Laughlin provides both condominium and apartment housing, for about 55 and 30 percent of the community's population, respectively. The remaining population lives either in mobile homes or single family detached housing. Outside of Laughlin, however, over 90 percent of the population in southern Clark County is housed in mobile homes. In Searchlight, for example, 525 of the estimated 575 residents (about 90 percent) live in mobile homes.

Local Housing

1. There are no permanent or temporary housing units at the Castle Mountain Project site. A few individual mobile homes and single family dwelling units are located on private lands in Lanfair Valley, associated with ranch operations or persons preferring to live in a desert rural environment. While there are a substantial number of privately-owned parcels in Lanfair

TABLE 4.11.3

SELECTED HOUSING CHARACTERISTICS

CHARACTERISTICS	LOCATION			
	SAN BERNARDINO COUNTY	CENSUS TRACT 103	CLARK COUNTY	CENSUS TRACT 57
Housing Units*	366,136	1,568	189,860	635
Vacant Units	57,493	461	15,969	97
Percent Vacant	15.7%	29.4%	8.4%	5.3%
Percent of vacant units held for occasional use	51%	34%	5%	24%
Percent owner occupied	68%	67%	59%	71%
Median Value	$63,000	$37,800	$66,800	$35,600
Median Rent	$221	$121	$264	$154
Percent single family residences	76%	50%	54%	17%
Percent mobile homes	7%	31%	11%	73%
Selected Utilities				
Percent using bottled gas for heating	4%	39%	2%	40%
Percent obtaining water from public system or private company	96%	35%	97%	67%
Percent using public sewers	72%	25%	95%	45%

*Exclusive of vacant seasonal units.

Source: U.S. Bureau of the Census 1983a,b.

Valley (a legacy of the homesteading that occurred in the Valley during the early years of this century), federal ownership of most land in the East Mojave Desert area, and County regulations to maintain 40-acre minimum lot sizes on private lands, restrict housing potential in this area.

4.11.4 PUBLIC SERVICES

Regional Services

1. Public services in the desert communities of eastern San Bernardino County are limited. Those that are available are generally the type that can be supported by a small local population. In California, Baker and Mountain Pass have educational, limited fire response, and police services. In Nevada, Searchlight and Laughlin have libraries, fire departments, some educational and police, and ambulance services and community medical facilities. Other services, including hospital and high school and college educational services, are available only within the larger urban centers that provide a full range of public services and facilities. These urban centers include the communities within Las Vegas valley and Barstow and Victorville/Apple Valley on the western edge of the Mojave Desert.

2. The BLM provides an emergency response capability to wildfires on public lands. These services are stationed near Hole-in-the-Wall, about 18 miles southeast of Cima, and at a BLM fire station in Apple Valley (CSB/BLM, 1985).

Local Services

1. There are no public services available at the project site.

4.12 INFRASTRUCTURE

4.12.1 TRANSPORTATION

4.12.1.1 Regional Transportation System

1. The principal roadway in the desert region of eastern San Bernardino and southern Clark Counties is Interstate 15, a divided, four-lane, limited access expressway. Interstate 15 is a principal north/south route in the national interstate highway system connecting the San Diego and greater Los Angeles metropolitan areas with the Las Vegas and Salt Lake City metropolitan areas. The Interstate 15 interchange nearest to the site is near Nipton, about 20 miles to the northwest. Average daily trips (ADT) on Interstate 15 near the Nipton exit is approximately 14,000.

2. Secondary highways in the region include U.S. Highway 95 and Nevada State Route 164. U.S. Highway 95 is a north/south highway linking Las Vegas and other communities such as Henderson, Searchlight, and Laughlin, Nevada with Interstate 40, west of Needles, California. Nevada State Route 164 and the Nipton Road in California link the Nipton interchange with Searchlight and U.S. Highway 95. Current traffic volumes on these roadways are about 3,000 ADT on U.S. Highway 95 near Searchlight and about 500 ADT on State Highway 164 west of Searchlight (CC, 1988b).

3. Local County-maintained roads in the vicinity of the Castle Mountain Project site are either two-lane paved, or graded dirt roadways. Ivanpah Road, maintained by the County of San Bernardino, is a paved two-lane roadway from its intersection with Nipton Road to about two miles east of Ivanpah. Traffic volumes along this road range from about 180 ADT to about 80 ADT east of Ivanpah. This roadway continues south through Lanfair Valley (Lanfair Road) as a two-lane graded roadway to Goffs. Traffic volumes on the Lanfair Valley segment range from 40 ADT at the old Lanfair townsite to 50 ADT at Goffs (SBDOT, 1988).

4. Traffic counts are not taken by Clark County on County Road A68P. It is assumed that volumes on this roadway are less than those on Lanfair Road, since it is essentially a one-lane graded roadway. It becomes an unimproved dirt road established by use just east of the State Line. The road is periodically used by off-road vehicle recreationists, ranchers, small game hunters, and mineral exploration crews.

4.12.1.2 Site Roads

1. The Hart Mine Road is primarily an improved dirt road between Barnwell and the project site. This roadway is about six miles long and uses the old roadbed of the abandoned Barnwell and Searchlight Railroad for the westerly portion near Barnwell. The road enters the proposed Castle Mountain Project site at the northwest corner and terminates at the southernmost clay pit.

2. Other roadways on and around the site are either jeep trails or rough dirt roads generally accessible by high-clearance vehicles. A network of temporary roads has been built through the proposed mine pit areas to permit access for exploratory drilling equipment.

4.12.2 UTILITIES

1. Formal utility infrastructure is limited in much of the outlying areas of eastern San Bernardino and southern Clark Counties. In general, most dwellings in this region rely on individual utility systems, such as bottled gas or propane, water wells, and septic tanks. Some desert communities provide small water distribution systems supplied by local ground water sources. Likewise, some wastewater collection systems may also serve small groups of residences.

2. There are no utilities at the project site. Water needs are provided from an onsite well. Portable toilets are provided at the project site.

4.12.3 ENERGY

4.12.3.1 Regional Power Sources

1. Regional power supply and facilities are provided by two private utility companies: (1) Southern California Edison in San Bernardino County, and (2) Nevada Power in Clark County. These companies obtain their power from a number of hydroelectric, fossil fuel, and nuclear sources. Various regional power transmission facilities are located in the area with major transmission corridors in Piute Valley and along Interstates 15 and 40. Smaller power transmission facilities are located in Ivanpah Valley along the Union Pacific Railroad and in Lanfair Valley between Goffs and the Federal Aviation Administration radio communications facility at the old Lanfair townsite.

2. There are no power transmission facilities serving the site. Those nearest the site terminate at the Vanderbilt mine near Barnwell.

CHAPTER 5.0
POTENTIAL ENVIRONMENTAL IMPACTS

5.0 POTENTIAL ENVIRONMENTAL IMPACTS

1. This chapter represents evaluations of the potential environmental consequences of the proposed action and alternatives. Based upon these evaluations, adverse effects which could not be avoided if the proposed action is implemented are summarized in Chapter 7.0, Unavoidable Adverse Impacts. The potential for cumulative impacts from the proposed action and other unrelated activities is addressed in Chapter 8.0, Cumulative Impacts.

5.1 INTRODUCTION

1. The impact evaluations in this chapter include discussions of forseeable effects on the existing environment that could occur from implementation of the proposed action or its alternatives. The analysis is formulated on the basis of available information, using reasonable projections of the worst possible consequences of the proposed action. For purposes of this report, an environmental impact is defined as a change in the status of the existing physical conditions that would be affected by the proposed action. The effects can be "direct" (or primary), which are caused by the project and occur at the same time and place, or indirect (or secondary) which are caused by the project and are later in time or farther removed in distance, but are still reasonably forseeable. The duration of the effect can be temporary (short-term) or relatively permanent (long-term). Anticipated effects are assessed quantitatively and/or qualitatively, as appropriate.

2. The significance of the anticipated impacts is assessed based upon criteria established for each environmental topic. In many cases, criterion are derived from standards in regulations or guidelines such as the Endangered Species Act, Clean Air Act, and the National Historic Preservation Act. The California Environmental Quality Act also provides guidance on effects that would normally be significant. Where no regulatory criterion were available, standards for determining significance have been developed in consultation with qualified individuals and with agencies responsible for the natural resource. Considerations for this were based upon acceptable change to the existing environment that would not result in a substantial detrimental effect, and included:

    - Resource sensitivity, or the probable response of a particular resource to project-related activities;
    - resource quality, or the present condition of the resource potentially affected;
    - resource quantity, or the amount of the resource potentially affected; and

- duration of impact, or the period of time over which the resource would be affected, stated as short-term (up to a few years) or long-term (beyond the operational life of the project).

These criteria are stated at the beginning of each section for the topic and specific issues being evaluated.

3. Because the proposed Castle Mountain Project is in the preliminary design stages, the site plan layout, operational characteristics, and scale of major facilities are fairly well defined. The evaluations in this chapter are based upon the current details of the project provided in Section 3.2, Proposed Action. The major elements considered include:

- Project Development
    - Onsite and offsite road construction
    - Power development and supply
    - Water development and supply
    - Facilities construction
- Mining and Processing Operations
    - Mining activities
    - Ore crushing and conveying
    - Heap leach operations
    - Gold recovery
    - Utilities and support facilities
    - Project traffic
    - Water and power supply
    - Hazardous materials management
    - Waste disposal
- Reclamation Activities
    - Removal of utilities and support facilities
    - Revegetation, including roads, heap leach piles, and overburden pile
    - Recontouring of overburden and heap leach piles
    - Staining of mine pit walls

4. It is typical of mining projects that final design modifications are made in response to additional exploration data, actual ore characteristics and quantities, processing experience, and evolving mining technology. In order to address the range of environmental effects which may occur throughout the life of the project, the environmental analyses in this chapter incorporate latitude for changes in facilities design and operational procedures while addressing the worst possible environmental consequences. It is expected that, with the exception of some offsite support facilities such as wells water lines, power distribution lines

and roads, modifications which may occur would be within the defined project site area (see Section 3.2, Proposed Action).

5. Measures to reduce or avoid the potential environmental effects of the proposed action have been identified through public comments submitted in the scoping process, and review from reviews by the U.S. Bureau of Land Management (BLM) and the County. The Applicant has revised the project to include most of these measures and has committed to incorporate the remaining measures in final design plans. These measures are restated specifically for each environmental topic in Chapter 6.0, Mitigation Measures. The effectiveness of these mitigation measures is considered in this impact evaluation.

5.2 GEOLOGY

1. Geologic hazards and constraints are discussed in this section. Impacts are considered significant if they could create one or more of the following conditions:

   - One or more project components could be severely damaged or destroyed as a direct consequence of a geologic event.
   - The release of chemicals into the environment could result from the occurrence of a geologic event.
   - A project component could create a substantial geologic hazard which could affect workers or other persons in the project area.

5.2.1 PROPOSED ACTION

1. The analysis of geologic hazards and conditions is derived from review of Applicant data and reports, documentation prepared by contractors on behalf of the Applicant, review of relevant material in the open literature, review of aerial photography, site visits, and calculations.

5.2.1.1 Faults and Seismicity

1. Capable faults could present a constraint on proposed development in the Castle Mountain Project area in two ways: (1) because of their potential for ground surface rupture, and (2) as a source of earthquakes and subsequent ground shaking.

2. As discussed in Section 4.2, there are no mapped or known faults (active or potentially active) that, if projected from the known limits, would traverse through or adjacent to the proposed project area. The closest capable fault is an inferred projection of an unnamed basin bounding fault that may lie two to three miles east of the site, paralleling the west side of the Piute Range. The potential for direct fault rupture in the vicinity of the proposed project is therefore considered insignificant. Planned activities considered are proposed solution impounding facilities, pipelines, and other features to be used in conjunction with the heap leach process. Also considered are proposed graded slopes related to roads or mining activities that, if disrupted by faulting, could cause mass movement of materials.

3. The study region lies in a moderately low (intensity/frequency) seismic region and is not likely to be subjected to strong earthquake ground motion during the project life. Although the

probability of a major nearby earthquake is very low in the next 100 years, the possibility does exist. This possible ground motion would be one of the principal potential hazards to the project, if facilities were not appropriately designed.

4. Table 5.2.1, Earthquake Parameters, summarizes the anticipated ground motions at the site based on empirical deterministic methods (Joyner and Fummel, 1986). Ground motions at a particular site are mainly dependent on the size (magnitude) of an earthquake and the epicentral distance (distance to the causative fault). The faults most likely to produce an earthquake within the life of the proposed Castle Mountain Project are termed "active." All of the known active faults are at distances in excess of 50 miles and, therefore, would produce relatively little ground motion. Faults with long return periods of several thousands of years are known as potentially active faults. The potential for rupture of these latter faults within a time frame of the next 100 years is considered insignificant.

5. From Table 5.2.1, it is evident that the distant active faults would cause very minor ground motion at the project site, should they produce a major earthquake. The worst case condition would occur in the unlikely event the west Piute Range bounding fault, located two miles east of the site, were to rupture and produce a major earthquake. Peak horizontal accelerations could reach 0.29g, with repeatable acceleration of 0.19g, lasting up to 16 seconds. The probability of such an event is considered to be low, especially given the relatively short period of project operation. The impacts of strong ground motions are considered significant but mitigable with appropriate design.

6. The secondary effects of a major nearby earthquake include liquefaction, subsidence, and landsliding. The potential for liquefaction is not considered significant due to the depth to the ground water table (i.e., greater than 400 feet). Basin subsidence as a result of dynamic shaking would be minimal (if at all) and not differential across the site area. Induced landsliding in the form of rock falls is possible on steep slopes, thereby exposing loose or very fractured bedrock. Facilities that would hold or impound potentially hazardous chemicals are located far enough from upland slopes to preclude damage from landsliding.

5.2.1.2 Mineral Resources

1. The proposed Castle Mountain Project would develop known deposits of disseminated gold ore. Three deposits, containing on the order of 30 million tons of ore, would be extracted during the period of operation. Development of this mineral resource is consistent with the

TABLE 5.2.1

EARTHQUAKE PARAMETERS

FAULT	DISTANCE AND DIRECTION TO FAULT (miles)	MAXIMUM [3] CREDIBLE EARTHQUAKE MAGNITUDE (M)	MAXIMUM [4] PROBABLE EARTHQUAKE MAGNITUDE (M)	PEAK [5] HORIZONTAL ACCELERATION (CREDIBLE EVENT) (g)	PEAK [5] HORIZONTAL ACCELERATION (PROBABLE EVENT) (g)	REPEATABLE STRONG HORIZONTAL ACCELERATION (PROBABLE EVENT) (g)	DURATION OF STRONG GROUND SHAKING (seconds)
San Andreas [1]	146, SW	8.25	8.25	<0.001	<0.001	<0.001	36
Garlock [1]	71, NW	7.6	7.0	0.17	0.13	0.09	24
Manix [1]	72, W	6.6	6.0	0.01	0.007	0.005	16
Ludlow [2]	67, SW	7.2	7.0	0.02	0.01	0.007	24
Piute Range Bounding [2]	2, E	6.5 [6]	6.0	0.38	0.29	0.19	16
State Line	17, NW	6.8 [7]	6.5	0.13	0.01	0.007	20

(1) Known active faults.
(2) Potentially active faults.
(3) Maximum credible earthquake based on the known tectonic fabric.
(4) Maximum probable earthquake is the event most likely to occur with a 100-year return period.
(5) After Joyner and Fumal, 1986.
(6) Based on a 12-mile length of rupture (Greensfelder, 1974).
(7) Based on a 19-mile length of rupture (Greensfelder, 1974).

General Mining Law of 1872 and Federal government policies that encourage such development of domestic mineral resources by private enterprise (30 U.S. Code, Section 21).

2. In disseminated gold deposits, a number of economic variables including gold price, metallurgical recovery and processing costs determine whether material being mined should be classified as ore, protore, or overburden. Future improvements in one or more of these variables could result in material presently classified as protore becoming economic to process and reclassified as ore. Loss of potentially economic gold ore could occur if protore was not separated in the overburden pile to facilitate future retrieval. The Applicant proposes to segregate protore in that portion of the overburden site closest to the crushing facility. In addition, the mine pit walls will be left exposed where mineralization occurs in sufficient concentrations that it may be potentially economic to recover in the future. These measures would insure the efficient use of the Castle Mountain orebodies.

5.2.1.3 Paleontological Resources

1. As discussed in Section 4.2, no deposits of paleontological interest are known to occur on the project site. However, it is possible that woodrat middens could be located in sheltered portions of rock outcrops in the vicinity of the proposed mine pits and overburden pile. The Applicant would contract an individual qualified in the assessment of such middens to inventory the project site for these resources prior to initiation of operations. If middens are located, they would be assessed for their potential paleontological value and extracted, if appropriate, at the discretion of BLM.

5.2.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. No change in potential project impacts from geological conditions would be expected from this alternative. Impacts described above for the proposed action would be applicable.

5.2.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state, and geologic events, such as earthquakes, would have no effects beyond those which would naturally occur.

5.3 WATER RESOURCES

5.3.1 PROPOSED ACTION

1. This section discusses impacts to water resources which could potentially result from the proposed Castle Mountain Project. The data is summarized from the detailed study by Environmental Solutions, Inc. (1988), titled Evaluation of Potential Effects on Lanfair Valley Aquifer and Piute Spring, which is incorporated by reference. The assessment of potential effects includes consideration of mitigation measures resulting from water pollution control and reclamation regulations, and modifications to the proposed project which have been made in response to public comments. A significant impact would be one which:

   - Degrades surface or ground water quality such that other uses would be significantly limited.
   - Substantially depletes ground water resources in Lanfair Valley.
   - Inhibits or reduces flow conditions at Piute Spring to the extent that the riparian habitat would be substantially affected or destroyed.

5.3.1.1 Surface Water

1. Effects of the proposed project on surface water quantity and quality elsewhere in Lanfair Valley would be minimal. There are no perennial waters at the site, and the facilities are arranged to minimize disruption to ephemeral surface water drainages. Process facilities using reagents (such as the solution ponds) during operation would be designed and constructed to contain large storm flows and avoid overflow discharges, using criteria approved by the Regional Water Quality Control Board (RWQCB), Colorado River Basin. During reclamation, flow from the process areas would be directed back into natural drainages, but only after the facilities undergoing reclamation had been neutralized in accordance with requirements of the RWQCB and/or BLM.

2. Based upon results of the exploratory drilling program, no significant quantity of water is expected to be encountered as the mine pits are excavated. Due to the limited rainfall and size of the completed mine pits, it is not expected that water would accumulate in the pits to the extent that surface discharges could occur.

3. Percolation through overburden materials would not be expected to significantly alter ground water or surface water quality. Samples of ore, protore and overburden have been subjected

to geochemical testing to determine the acid generation potential and extractable metals. Results are summarized in Table 5.3.1, Summary of Results, Analysis of Ore, Protore and Overburden. As indicated in the table, the material is slightly alkaline in nature and would not produce acidic leachate conditions. Also, the measured concentration of metals frequently associated with gold ore are relatively low in relation to concentrations considered to be of potential concern by the State. The metal concentrations shown in the table are based on a laboratory procedure which uses citric acid to intentionally leach metals out of the solid material. The amount of metals leached under non-acid conditions, such as those expected for the overburden pile, would be much lower.

4. Over time, inflow of water from precipitation to the mine pits could cause a buildup of dissolved solids. Since no ground water has been encountered in orebody definition drilling, the potential for dissolved solids from the pits to enter ground water is considered to be minor.

5.3.1.2 <u>Ground Water</u>

1. The evaluation of potential ground water impacts is based on the Applicant's estimated average consumption rate of about 450 gpm (725 acre-feet per year) for a period of about 10 years. Most of this water would be obtained from about 10 wells in the proposed West Well Field, located about two miles west of the proposed project. A small portion may also be obtained from several lower yielding wells in the project area. This use rate is less than earlier estimates of 1,650 and 1,140 acre-feet per year, reflecting reductions achieved as a result of processing modifications made to minimize water requirements.

2. Aquifer performance resulting from the proposed ground water withdrawal is discussed in the following sections and is based upon:

   - Evaluation of conditions in the West Well Field, as determined by the Mark Group (1988).
   - Evaluation of the potential for short- and long-term impacts at Piute Spring, as determined by Environmental Solutions, Inc. (1988).

TABLE 5.3.1

SUMMARY OF RESULTS
ANALYSIS OF ORE, PROTORE, AND OVERBURDEN

PARAMETER		RESULTS FOR TWO SEPARATE ANALYSES			STLC[1]
		MAXIMUM VALUE	MINIMUM VALUE	AVERAGE	
ACID POTENTIAL	Neutralization Potential (tons $CaCO_3$/1,000 tons of material)	105.7	2.9	54.3	--
	Potential Acidity (tons $CaCO_3$/1,000 tons of material)	4.7	<0.3	2.4	--
	Net Acid/Base Potential (± tons $CaCO_3$/1,000 tons of material)	101.0	2.9	51.9	--
METALS (Concentrations in mg/l)	Arsenic	0.24	0.08	0.16	5.0
	Barium	6.9	2.2	4.5	100.0
	Cadmium	0.01	<0.01	<0.01	1.0
	Chromium	0.14	0.11	0.125	5.0
	Lead	5.51	1.76	3.6	5.0
	Mercury	0.0005	<0.0003	0.0004	0.2
	Selenium	<0.10	<0.10	<0.10	1.0
	Silver	0.03	0.04	0.035	5.0

[1] Soluble Threshold Limit Concentration for Hazardous Waste, Code of Regulations Title 22. Extract metals determined by CAL WET Test.

-- Not Applicable

West Well Field

1. The withdrawal of 450 gpm (725 acre-feet annually) from the West Well Field would exceed the estimated recharge of 300 to 500 acre-feet per year to that portion of Lanfair Valley. Therefore, during the period of operation, water would be removed from existing aquifer storage.

2. To evaluate the localized effect of this withdrawal, the Prickett-Lonequist Aquifer Simulation Model (PLASM) computer model was applied to an 8-mile wide by 10-mile long area surrounding the West Well Field (Mark Group, 1988). A conservative pumping rate of 900 gpm was applied to the model, and ground water drawdown rates were calculated for each pumping well location and for the general area surrounding the well field. The general drawdown in the well field was calculated to be about 60 feet, with changes in ground water level at distances of greater than two miles generally less than 10 feet. The results of the modeling show that there would be no effect to Piute Spring area during the 10-year period of pumping.

3. The potential effect of pumping was further evaluated by comparing the amount of water that would be removed from aquifer storage to the estimated amount of ground water presently stored within the aquifer in the vicinity of the West Well Field. The amount of ground water in storage within a 7-square mile area (the area with calculated drawdown of 10 feet or more due to project pumping) is estimated to be 112,000 acre-feet. This compares to a net withdrawal (pumping minus recharge) of about 325 acre-feet per year. Thus, about 0.3 percent of the presently stored water would be removed annually, or about three percent during the proposed 10-year operating period.

4. Based on the analyses of the extent of water table drawdown and percentage of stored water removed due to pumping, it is concluded that sustained pumping of about 450 gpm from any number of wells in the proposed West Well Field would be possible for the duration of the project, without affecting other existing or potential ground water users in Lanfair Valley and without adverse effects to Piute Spring.

Piute Spring

1. Localized effects of pumping during the operational life of the proposed project are to be expected. However, considering the extensive area of Lanfair Valley and the relatively long travel times (600 to 1,400 years) estimated for ground water to flow across the Valley, effects of pumping would not be expected to occur in the Piute Spring area during the operational period. Modeling of the West Well Field area, discussed above, confirms this conclusion. However, at the end of the operational period, a net amount of water would have been removed from the basin, and modeling was done to determine if that effect could eventually cause any adverse effect to Piute Spring. A long-term effect would occur if the drawdown "cone of depression" at the well field were to slowly spread in size over the entire Valley, or if the cone were to migrate toward the spring area before being eliminated by natural recharge to the extent that flow conditions at this spring would be appreciably modified.

2. The simplest estimate of long-term effects of drawdown would be to assume that the extraction of 7,250 acre-feet (725 acre-feet for 10 years) would be distributed over the entire, approximately 240-square mile northeastern portion of the basin. This would result in an average water level decrease of about 0.5 foot. This amount of change would not noticeably affect conditions at the spring, as the water elevation difference between the Lanfair Valley aquifer and the Piute Spring initial discharge point is about 80 feet.

3. In order to evaluate the potential condition of the cone of depression migrating toward the spring, an additional three-dimensional computer model was developed for the entire Lanfair Valley basin, using the McDonald and Harbough (1984) code developed by the USGS (Environmental Solutions, 1988). This model was used to: (1) initially predict the localized drawdown conditions in the vicinity of the West Well Field, and (2) then observe conditions throughout the entire basin for a period of 1 to 1,000 years.

4. Figure 5.3.1, Lanfair Valley Drawdown (in feet), shows the predicted cone of depression at initiation of pumping, after 10 years of pumping, and at periods of 1, 7, and 30 years after the pumping has stopped. The modeling showed the following:

   - During pumping, the cone of depression is limited to a radius of about six miles from the well field.

- Due to natural recharge, the cone of depression begins to dissipate after completion of pumping. The depressed zone is nearly gone in seven years and is completely gone within 30 years.
- During the term that the cone of depression is being dissipated, it does not migrate measurably toward Piute Range, so a large water level decrease near Piute Spring would not be expected.

5. The model was also used to determine if underflow to Piute Valley, including flow at the spring, would change in response to pumping. This was accomplished by calculating discharge for the same periods for computer runs with and without pumping. The periods examined ranged between 1 and 1,000 years. This comparison shows the discharge to be identical for each time increment, further indicating that changes do not occur at large distances from the well field.

6. Based on these analyses, it is concluded that the proposed pumping from the West Well Field would have no noticeable adverse effect on Piute Spring.

5.3.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. Impacts determined for the proposed action would be applicable to this alternative.

5.3.3 NO ACTION ALTERNATIVE

1. If this alternative were to be implemented, water would not be withdrawn from the Lanfair Valley basin. Therefore, the short-term drawdown of the ground water level in the vicinity of the West Well Field would not occur. Also, minor diversions of surface run-off in the project area would not be required. No mitigation measures to protect water quality would be necessary.

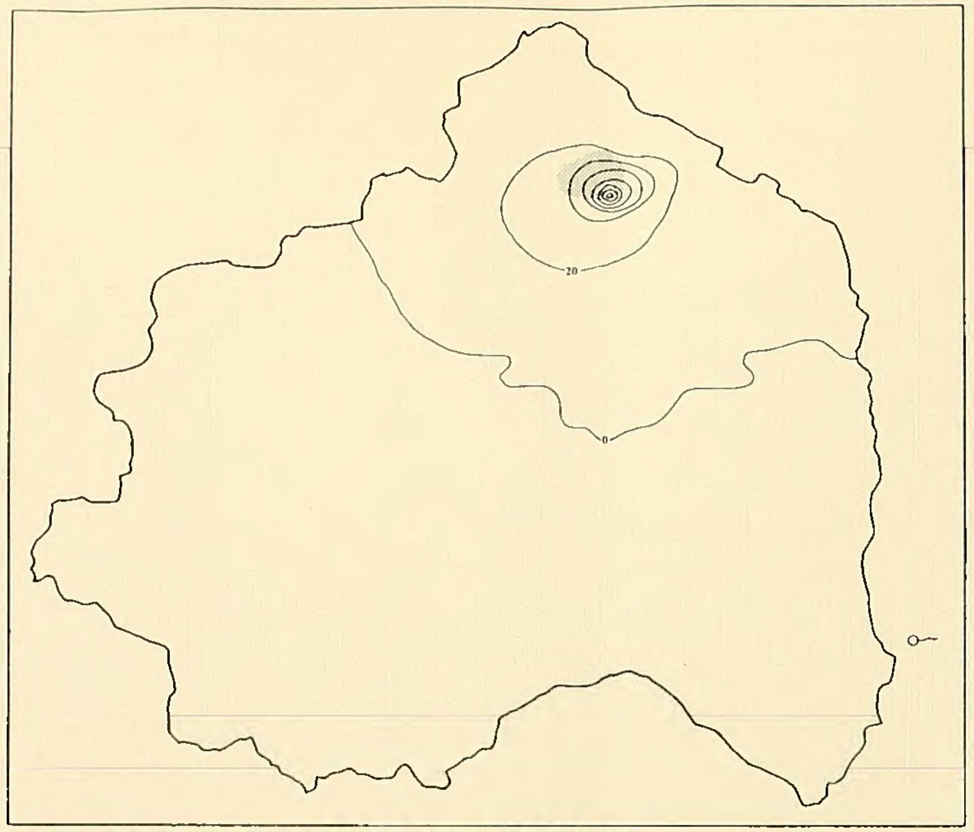


PLATE 1: ONE YEAR AFTER PROJECT INITIATION

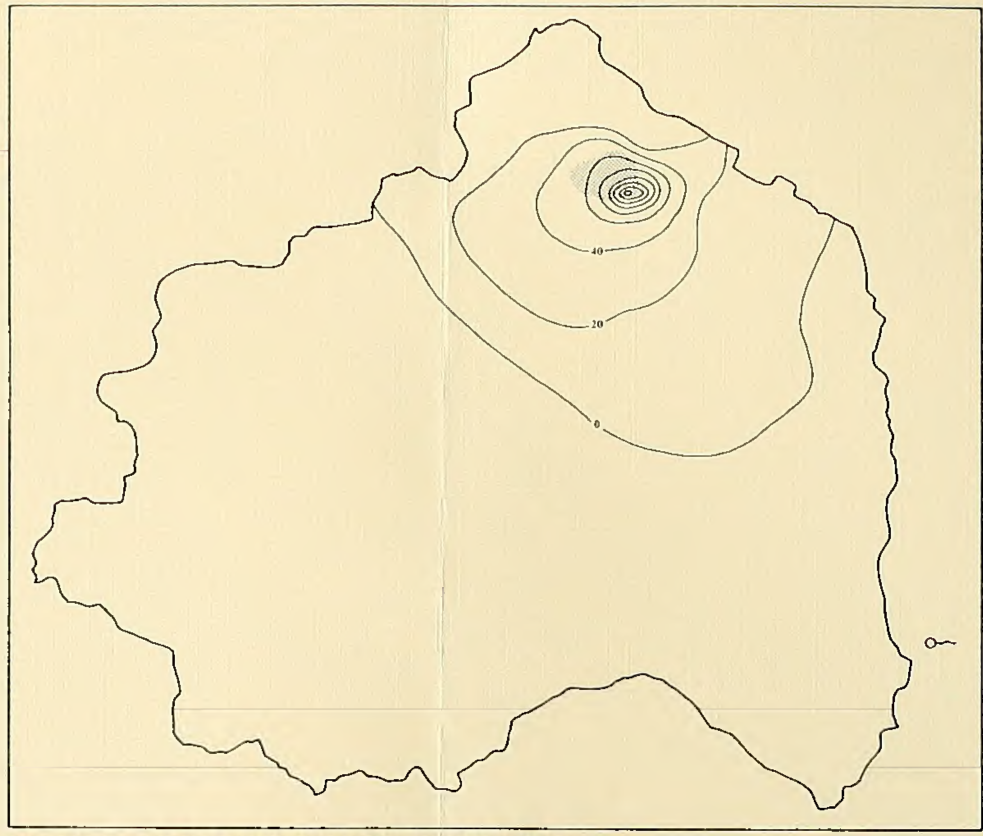


PLATE 2: AFTER TEN YEARS OF PUMPING

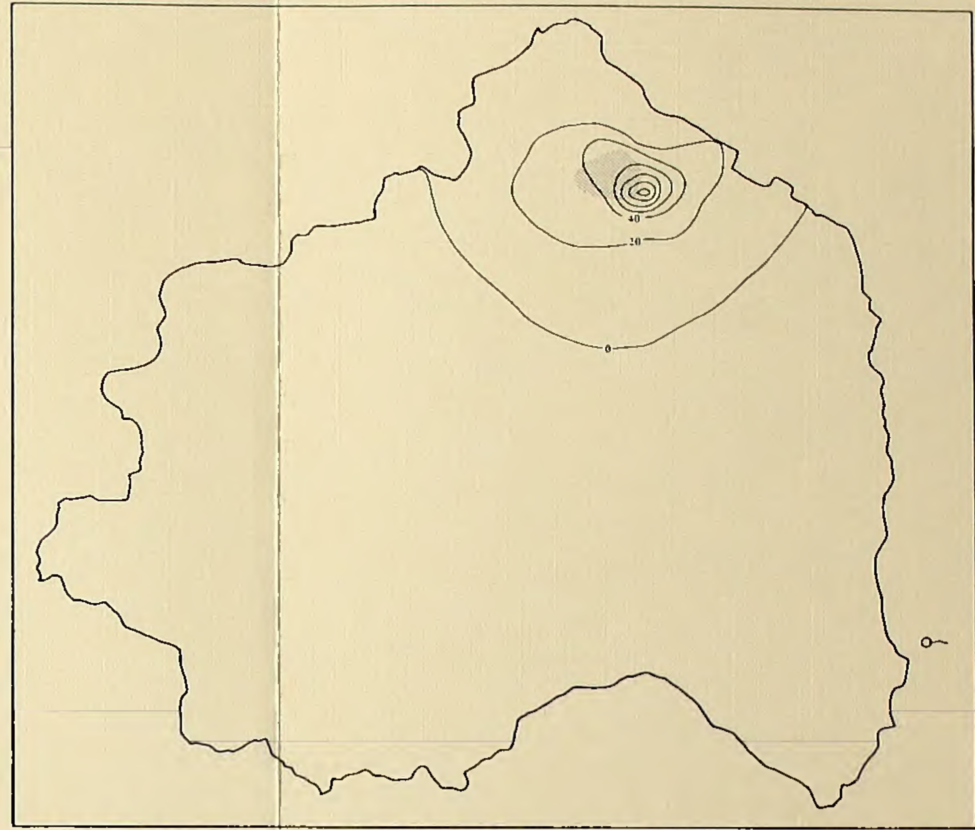


PLATE 3: ONE YEAR FOLLOWING PROJECT COMPLETION

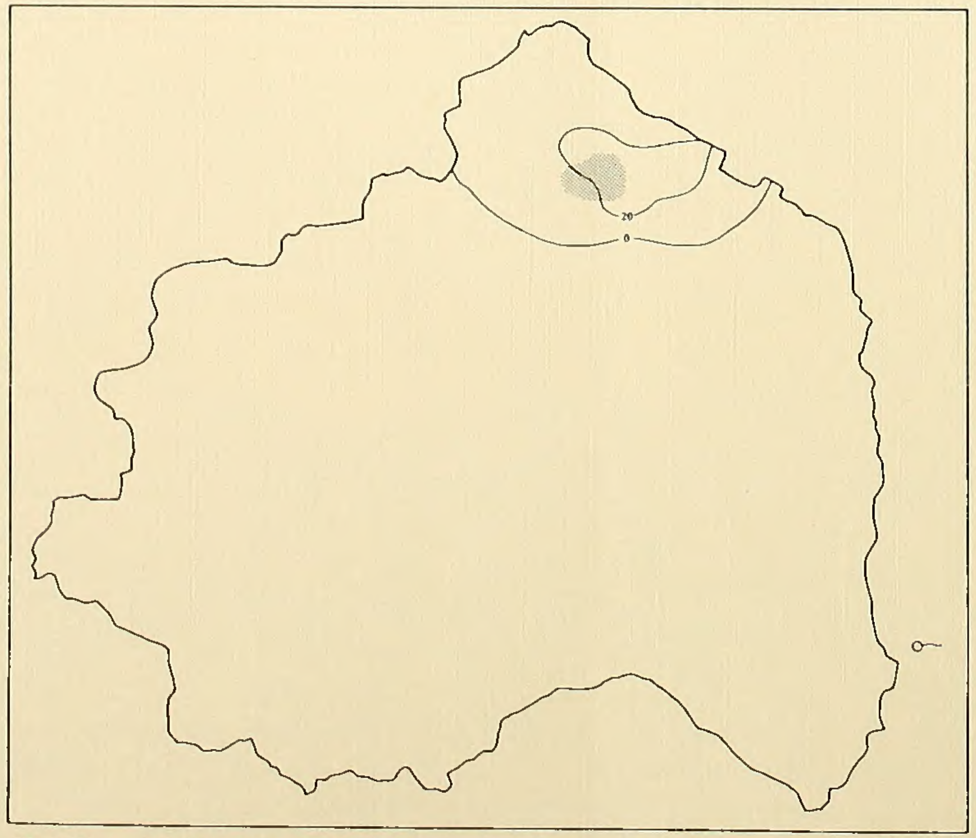


PLATE 4: SEVEN YEARS FOLLOWING PROJECT COMPLETION

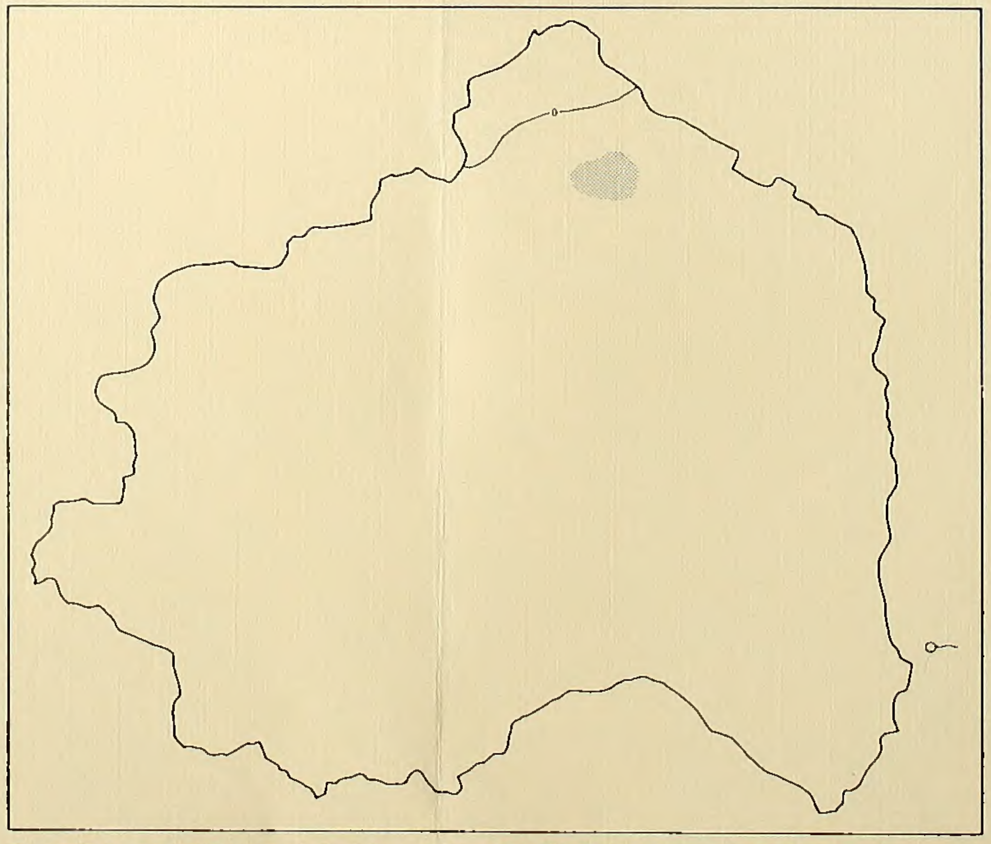


PLATE 5: THIRTY YEARS FOLLOWING PROJECT COMPLETION

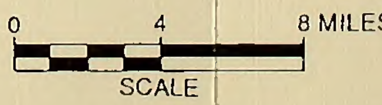
EXPLANATION:
THESE FIGURES DEPICT THE PREDICTED DISTRIBUTION AND LEVEL OF DRAWDOWN THAT WOULD OCCUR FROM PUMPING 450 gpm ANNUALLY FROM THE WEST WELL FIELD FOR A PERIOD OF 10 YEARS. THE DRAWDOWN CONTOURS SHOWN WERE DETERMINED USING A U.S. GEOLOGICAL SURVEY COMPUTER MODEL TO CALCULATE THE MAXIMUM GROUND WATER PUMPING IMPACT AREA AND THE LENGTH OF TIME REQUIRED FOR RECHARGE TO DISSIPATE THE CONE OF DEPRESSION. AQUIFER DRAWDOWN IS SHOWN IN 20-FOOT CONTOUR INTERVALS.

LEGEND

WEST WELL FIELD

PIUTE SPRING

20 DRAWDOWN CONTOUR (FEET)



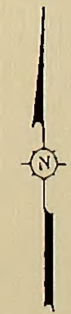


FIGURE 5.3.1

LANFAIR VALLEY DRAWDOWN (IN FEET)

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

5.4 VEGETATION

1. Impacts to vegetation expected from the proposed action and evaluated in this section include: (1) removal of portions of the regional vegetation communities and assemblages, (2) potential for removal of individuals of special interest species, and (3) the potential for establishment of exotic species in disturbed areas.

2. Impacts to vegetation would be considered potentially significant if they could:

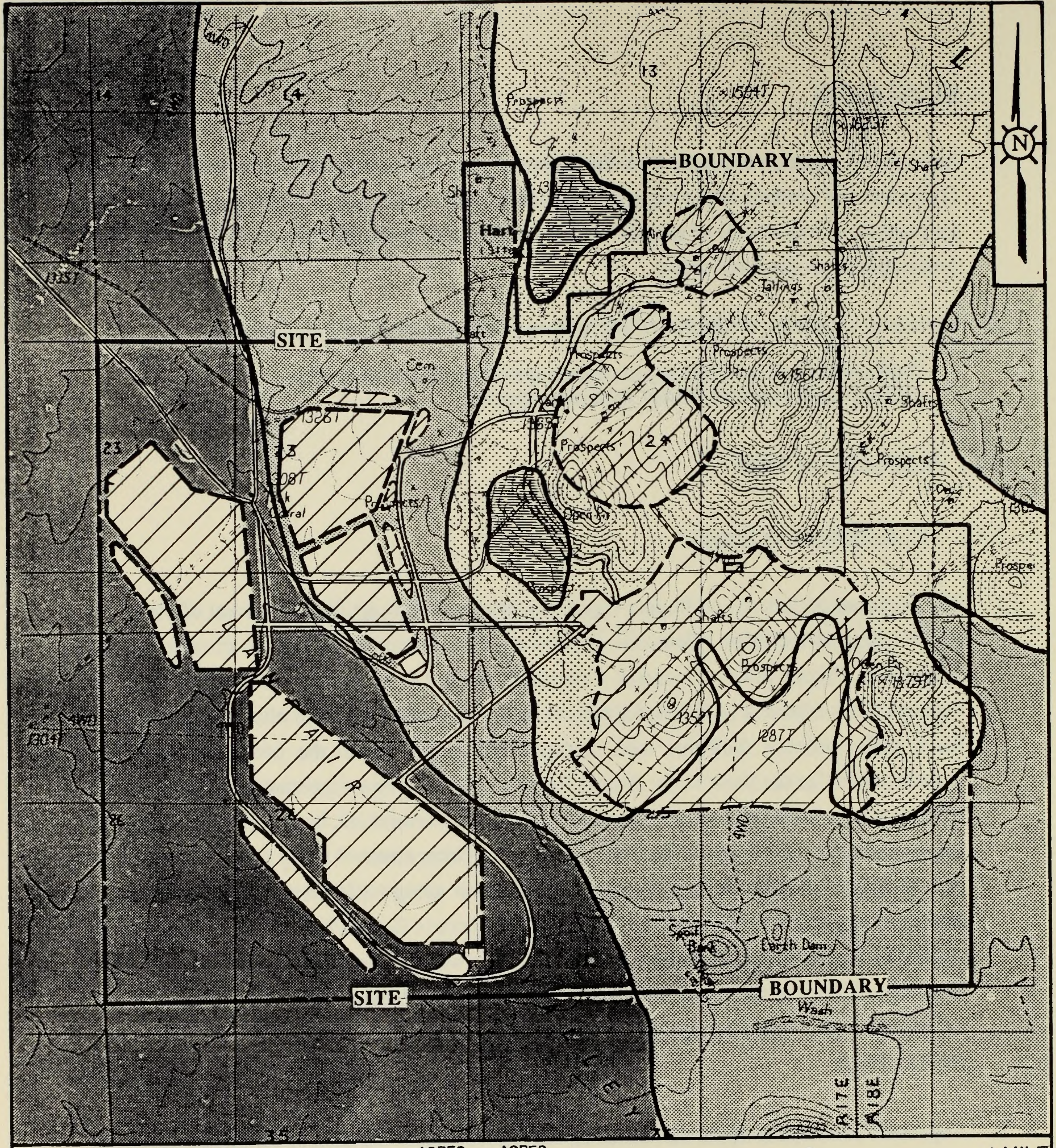
   - Substantially affect a threatened or endangered species or its habitat.
   - Substantially diminish habitat for a plant species.

5.4.1 PROPOSED ACTION

5.4.1.1 Plant Community Impact

1. The proposed project would impact vegetation primarily through direct removal of plants for construction of facilities. Potential impacts to plant communities on the project site are mapped in Figure 5.4.1, Potential Vegetation Impact. As shown, about 890 acres of vegetation are expected to be lost for project facilities, mainly the mine pits, overburden pile, leach pads, process facilities, soil storage, and roads within the project site. Road improvements for the Searchlight Access Route would remove a maximum of about 20 acres of the creosote bush scrub and Joshua tree woodland communities, based upon 10.8 miles of improvements for a 16-foot wide road. Actual vegetation removal along this route would be less, as about 7.5 miles of improvements would occur along trails where use has previously disturbed vegetation (see Figure 4.1.7, Searchlight Access Route Photographs). Removal of vegetation for development of the West Well Field or water conveyance lines would be minor, since the majority of the water conveyance lines would be located within Hart mine road, and individual wells would occupy less than 25 x 25 feet each (see Figure 3.2.9, Preliminary Utilities Plan).

2. Vegetation removed at upper elevations on the site, such as in the area of the mine pits, would be of the blackbush scrub community. About 370 acres (or 35 percent of this community on-site) would be removed. Vegetation removed for the northerly leach pads, soil storage, and portions of the overburden pile would be primarily of the Joshua tree woodland community covering approximately 205 acres or about 30 percent of this community onsite.



PLANT COMMUNITY	ACRES ONSITE	ACRES REMOVED
DESERT GRASSLAND/CREOSOTE BRUSH SCRUB/JOSHUA TREE WOODLAND	985	315
JOSHUA TREE WOODLAND	650	205
BLACKBUSH SCRUB	1,060	370
UNVEGETATED CLAY PITS	40	–
TOTAL ACRES	2,735	890

VEGETATION REMOVED FOR ROADS AND ANCILLARY FACILITIES

VEGETATION REMOVED FOR MAJOR FACILITIES

CONTOUR INTERVAL: 10 METERS

REFERENCE: 7.5-MIN. U.S.G.S. TOPOGRAPHIC MAPS OF HART PEAK, CALIF. - NEV., AND CASTLE PEAKS, CALIF. DATED: 1984 SCALE: 1: 2000

0 .5 1 MILE
SCALE

FIGURE 5.4.1

POTENTIAL VEGETATION IMPACT

CASTLE MOUNTAIN PROJECT

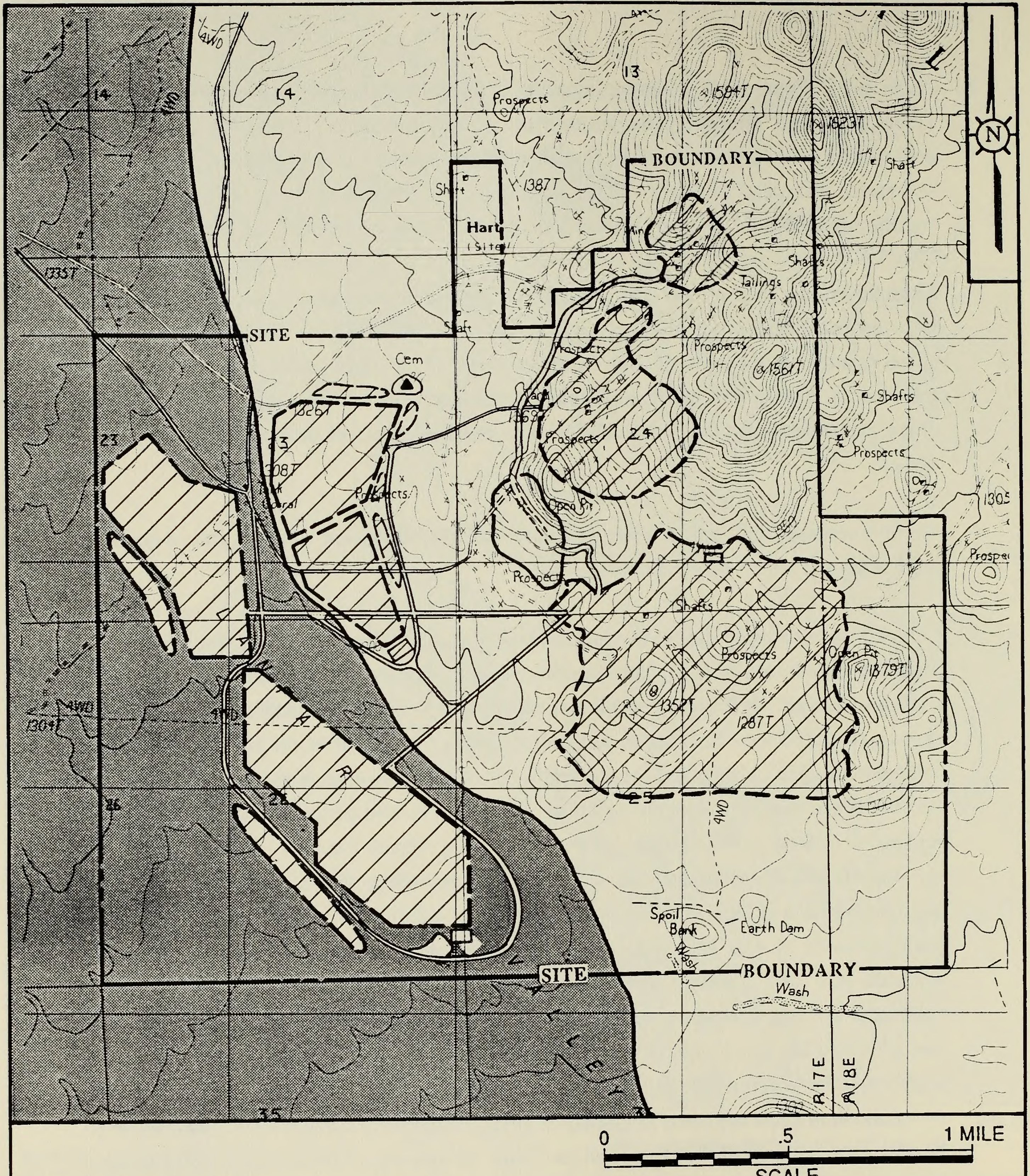
ENVIRONMENTAL SOLUTIONS, INC.

REVISED 2/21/89

3. As shown in Figure 5.4.2, Potential Impact to Unusual Plant Assemblage, about 315 acres of desert grassland unusual plant assemblage (UPA) understory would be removed in conjunction with construction of the two westerly leach pads, soil storage areas, process plant and roads, and solution ponds. This would represent about 30 percent of the area of this community within the project site and less than 0.2 percent of the UPA in Lanfair Valley. This UPA is classified by BLM (1988) as "subject to disturbance, but not sensitive." Reestablishment on the heap piles may be slower than customary for surface disturbance recovery because it would be a new surface and low in soil nutrients. The planned removal, storage, and replacement of soil in these areas would, however, assist in heap pile reclamation. The success of reestablishment on the leach pile surface would be studied as part of the planned revegetation research project, in order to minimize recovery time on the new surface.

4. The five creosote rings which were recorded by Gould (1987a) are located north of the heap leach areas and would not be disturbed.

5. Concern was expressed during the public scoping process that, through site disturbance, the proposed project may facilitate introduction of exotic plant species such as the Russian thistle (*Salsola iberica*). Removal of vegetation cover often provides open habitat for invasion of opportunistic species - both native and exotic. Many exotic species are already established throughout Lanfair Valley and the eastern Mojave Desert because of past disturbances, and because of the relatively open habitat created by widely spaced perennial plants. The species list included in Appendix C shows that exotic species such as *Erodium cicutarium, Bromus rubens, Bromus tectorum,* and *Salsola iberica* already occur on the project site and in the surrounding areas of Lanfair Valley. Many portions of Lanfair Valley and the project site have been disturbed by past agriculture, grazing, mining, and other activities and subjected to invasion of exotic species. Therefore, since the project would involve disturbance of additional acreage, it would continue with other surface disturbing activities, in providing opportunities for establishment of these species. To deter substantial establishment of undesirable species, it would be beneficial for the planned reclamation program to implement revegetation of disturbed areas as quickly as possible following completion of activities over an area (see Section 3.2.8.2, Reclamation Plan). If invasion of exotics becomes a serious issue, a weed control program would be implemented in compliance with applicable Federal, State, and local laws. The weed control efforts would be implemented in conjunction with fertilization and seeding.



LEGEND

		ACRES REMOVED
▲	AREA OF CREOSOTE RINGS	
	DESERT GRASSLAND UPA	315
	VEGETATION AREA REMOVED	

CONTOUR INTERVAL: 10 METERS

REFERENCE: 7.5-MIN. U.S.G.S. TOPOGRAPHIC MAPS OF HART PEAK, CALIF. - NEV., AND CASTLE PEAKS, CALIF. DATED: 1984 SCALE: 1: 2000

FIGURE 5.4.2

POTENTIAL IMPACT TO UNUSUAL PLANT ASSEMBLAGE

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

REVISED 2/21/89

6. Concern also was expressed during the scoping process that vegetation associated with Piute Spring would be indirectly affected if the project were to substantially decrease the flow of water. As discussed in Section 5.3, Water Resources, the ground water supply to Piute Spring would not be diminished by the proposed action. Therefore, there would be no project-related effects to the riparian vegetation in that area.

7. The vegetated areas that would be disturbed by the project represent less than 35 percent of the project site and 0.4 percent of the vegetation in the 340-square mile Lanfair Valley. As such, it is not considered a significant portion of the plant community or associated wildlife habitat available in the area. Revegetation of the majority of disturbed portions of the site would occur through the project reclamation plan and by natural processes. Heap leach piles, overburden pile, process plant, solution ponds, and access roads would be reclaimed by redistribution of stored soil and by reseeding and fertilization, or other revegetation methods determined appropriate by the revegetation research program planned as part of reclamation required by the California Surface Mining and Reclamation Act. Other disturbed areas, such as the rock faces of the mine pit walls, are not expected to facilitate reestablishment of the blackbush scrub community to its predisturbance density or species composition. It is anticipated that reestablishment of pre-disturbance vegetation cover and species composition would be a lengthy process; studies indicate that between 30 and 60 years is commonly required in this environment for recovery by natural processes (USGS, 1988). The natural revegetation that has occurred over the Hart townsite during the last 70 years provides evidence supporting this time frame.

8. Vegetation recovery is a function of the type and degree of soil disturbance. Disturbed or compacted soils associated with construction or human activity may take longer to recover than soils disturbed by natural disturbances (such as flooding), in part because seeds, and perhaps related symbionts (rhizobial bacteria for example), may no longer be present (Virginia and Bainbridge, 1987). Revegetation strategies would be implemented to reduce the time involved for natural plant establishment on land disturbed by the proposed action. As described in Section 3.2.8.2, Reclamation Plan, examples of strategies in desert revegetation studies include soil preparation (scarification and topsoil restoration), irrigation, reseeding, transplantation, plant protection, and fertilization. Application of these strategies on the project site would be determined through studies completed for the revegetation program.

5.4.1.2 Special Interest Species

1. Based upon the onsite vegetation inventories, literature reviews of species distributions, and the various agency and organization plant lists, the proposed project would not affect any known or suspected threatened or endangered species. While the Category 2 candidate *Penstemon stephensii* may occur on the site, its presence may be due to previous disturbances that facilitate establishment of this species. Surface disturbances by the proposed project would therefore not be expected to reduce its potential habitat.

5.4.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include development of the proposed action, but no road improvements along the Searchlight Access Route would be completed. Project traffic would therefore use existing access routes, primarily Ivanpah Road, for ingress and egress. If this alternative were to be implemented, construction and related vegetation removal along the Searchlight Access Route would be limited to that necessary for the natural gas pipeline that would still follow this general alignment. This would reduce projected disturbances by the proposed action of creosote bush scrub and Joshua tree woodland communities by about 20 acres. No significant vegetation impact is expected.

5.4.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to vegetation would occur.

5.5 WILDLIFE

1. The following section evaluates the potential impacts of the Castle Mountain Project on wildlife. The identified wildlife issues identified are: (1) reduction of wildlife habitat quality by removal of approximately 890 acres of vegetation and destruction of animal burrows, (2) potential exposure of wildlife to cyanide solution, (3) indirect impact to the Piute Spring riparian habitat through withdrawal of Lanfair Valley ground water (if Piute Spring were to be affected), (4) the impact of increased road traffic on desert tortoise populations in Ivanpah and Piute Valleys, (5) introduction of artificial lighting, (6) disturbance of wildlife guzzlers, (7) increased noise levels, (8) potential increase in ravens, and (9) raptor electrocution.

2. Impacts to wildlife are considered potentially significant if they could create one or more of the following conditions:

   - Substantially diminish the habitat for a wildlife species
   - Interfere substantially with the movement of resident or migratory wildlife species
   - Substantially affect a threatened or endangered species or its habitat, or a species officially proposed as threatened or endangered

5.5.1 PROPOSED ACTION

1. Potential impacts to wildlife would occur from both construction and operations activities associated with the Castle Mountain Project. Habitat quality would be reduced through direct removal of vegetation in the areas of mine pits, overburden disposal, leach pads, process facilities and roads. Direct mortality could occur to resident animals in burrows or nests destroyed by heavy equipment. Animals which would move (or be moved) offsite could indirectly affect animals in adjoining habitat by inducing temporary population stress. Daily operations could impact species sensitive to high noise levels. Fatalities of birds, mammals, rodents, and insects could occur from ingestion of cyanide. Increased traffic could impact animals on access roads through the Ivanpah and Piute Valleys. These potential effects of the action are evaluated in the remainder of this section.

2. In response to public and agency comment, the Applicant has incorporated several measures into the project design to avoid or reduce potential wildlife impacts. The effectiveness of these measures is evaluated in conjunction with the potential impacts described.

5.5.1.1 Facilities Impact on Wildlife

Impact on Wildlife Habitat

1. Implementation of the Castle Mountain Project would result in an incremental reduction in the quality of onsite wildlife habitat as facilities are developed over the life of the mine. At project completion, a total of about 890 acres for the site and 20 acres for the Searchlight Access Route would be disturbed in the blackbush scrub and Joshua tree woodland/creosote bush scrub/desert grassland habitats. These habitats are used by various animals common to the Mojave Desert, as described in Section 4.5. Reduction of habitat quality would occur for two special interest species: Bendire's thrasher and bighorn sheep. In addition, habitat used by bats and the desert tortoise could be affected.

2. The Bendire's thrasher occurs in the Joshua tree woodland/creosote bush scrub habitat of this region at certain times of the year. About 315 acres of this habitat would be removed, primarily for heap leach pads. This represents 30 percent of this habitat onsite and less than 0.2 percent of this habitat within Lanfair Valley. As such, the vegetation removal would not significantly affect this species.

3. As described in Section 4.5, approximately 15 desert bighorn sheep are known to inhabit the Castle Mountains and northern portion of the Piute Range. Although their specific range has not been mapped, the 890 acres of forage area removed for the project would be about three percent of their available habitat in this mountainous area covering about 47 square miles. There are no bighorn sheep watering holes on the project site. No significant impact to this population is anticipated.

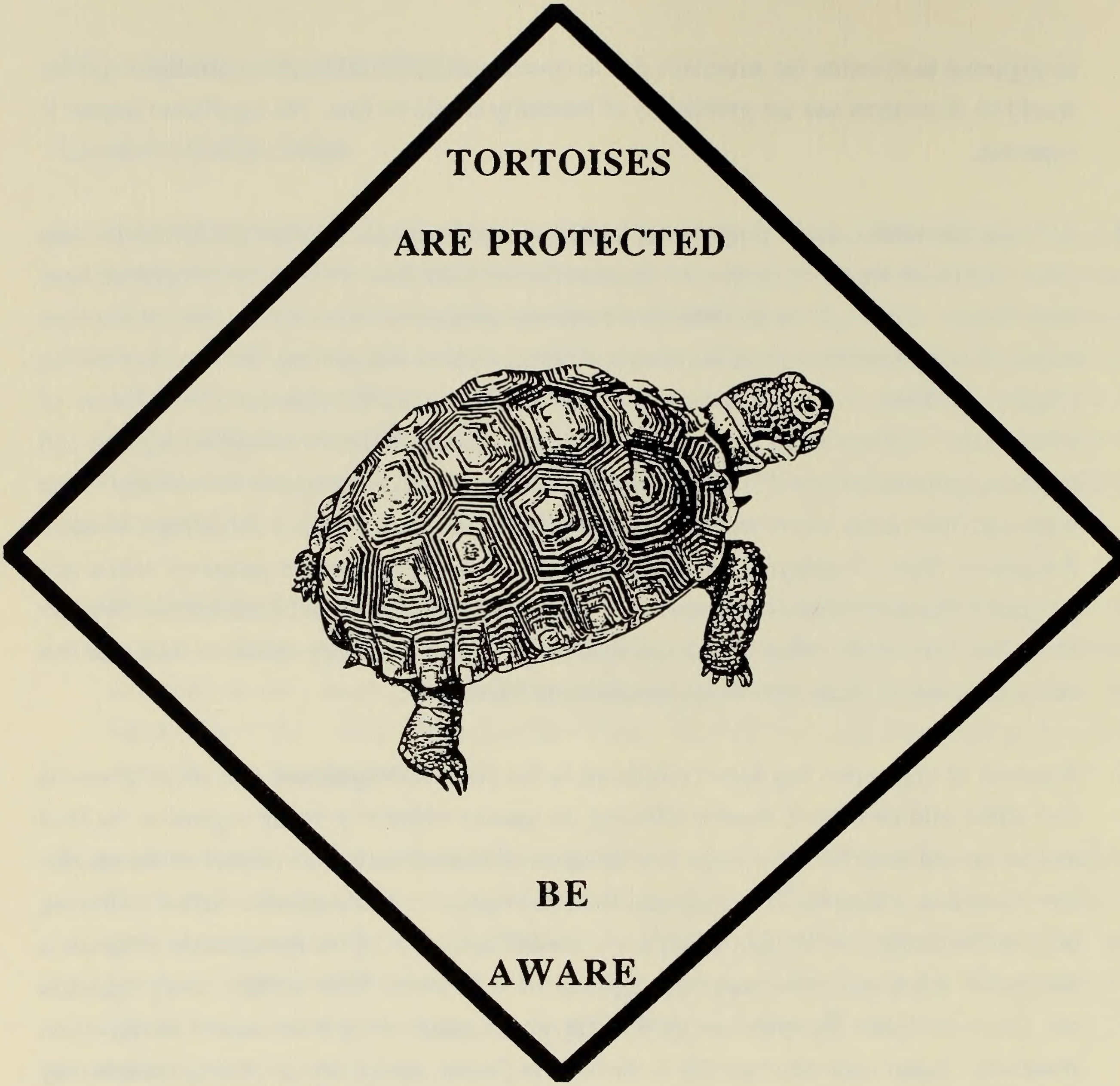
4. About 23 of the 39 abandoned mine shafts or adits on the site ($\pm$ 60 percent) would be removed in the area of the mine pits. This would leave about 40 percent of the former workings for potential wildlife habitat. Bats are not expected to use the mine shafts, adits, or other former mine workings at the project site in substantial numbers. However, a detailed evaluation of the workings would be completed during the winter hibernation period to determine the degree of bat use, if any. If a colony or substantial use of the workings by individuals is found, the workings would not be disturbed until the hibernation period had been complete and the bats had gone. Owls or ringtails which may also use this habitat would

be expected to abandon the structures due to operational noise. Disturbance to these species would be short-term and the probability of mortality would be low. No significant impact is expected.

5. At lower elevations on the project site, leach pads, soil storage, solution ponds, the process plant, and roads would be developed surrounding the wash area where tortoise burrows have been found. Although no facilities are currently planned in areas where known burrows occur, it is expected that some burrows and desert tortoise habitat may be disturbed during project operations. Project activities would also increase the risk for direct losses of individuals. To minimize potential impacts to tortoises, burrows would be located and inspected prior to surface disturbing activities. Signs would be posted in the vicinity of the wash and other areas where tortoises could occur, as shown in Figure 5.5.1, Desert Tortoise Awareness Sign. Employees would be informed about the tortoise's protected status and proper handling techniques as shown in Figure 5.5.2, Employee and Construction Worker Procedure Card. If tortoises were found in areas to be disturbed, they would be relocated to a safe area or offsite using procedures acceptable to BLM.

6. Removal of vegetation has been considered in Section 5.4, Vegetation. Its removal would also affect wildlife habitat, thereby affecting the species which rely on the vegetation for food and cover. As described in Section 5.4, reclamation procedures for the project would include a revegetation program. It is expected that, as vegetation becomes established following project completion, the level of wildlife use would reestablish. If the revegetation program is successful, this repopulation may be as rapid as 10 or 20 years. If the revegetation program is not successful, then repopulation by wildlife would occur along with natural revegetation processes. Based upon other studies in the Mojave Desert, natural revegetation processes may require as long as 30 to 60 years to reestablish pre-disturbance cover and composition (USGS, 1988). Removal of a portion of these widespread habitats would not be expected to significantly affect an animal species.

7. The proposed project is not expected to significantly interrupt wildlife movement patterns or result in significant habitat fragmentation. However, some avoidance of the area during the life of the project is expected, due to loss of habitat, presence of humans, and noise. The project area does not intercept known unique migratory pathways. On a regional scale, the total habitat area affected by the Castle Mountain Project would represent about 0.4 percent of similar habitat area in Lanfair Valley.



DESCRIPTION

Yellow, nonreflective color
Black letters
Diamond-shape sign
30 inches high

SOURCE: VCR MINING PROJECT FINAL EIR/EA
BLM, EL CENTRO RESOURCE AREA 1987

FIGURE 5.5.1

DESERT TORTOISE AWARENESS SIGN

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

SIDE "A"

Castle Mountain Project

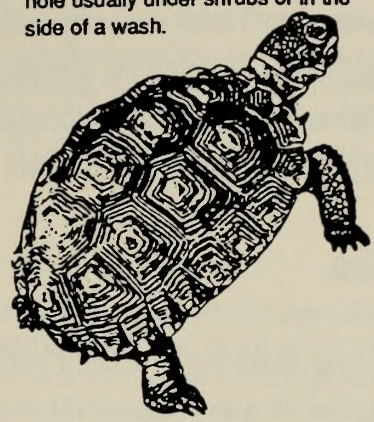
PROTECTION OF THE DESERT TORTOISE

The Desert Tortoise is protected by state law.

The operator prohibits any employee from taking a tortoise from the project site at any time.

Do not disturb a Desert Tortoise.

The Desert Tortoise is a 6- to 14-inch reptile with a domed, brown shell and four short, scaley legs. The tortoise will likely be under a shrub, eating or sleeping, or near its burrow, which is a hole usually under shrubs or in the side of a wash.



SIDE "B"

PROCEDURE FOR PROTECTION OF THE DESERT TORTOISE

If you see a tortoise, determine if it is in any danger from operations.

IF THE TORTOISE IS NOT IN DANGER: Leave it alone!

IF THE TORTOISE IS NOT IN IMMEDIATE DANGER, BUT IS IN A PLACE WHERE IT WILL BE EXPOSED TO TRAFFIC OR OTHER HAZARDS, OR

IF THE TORTOISE IS IN IMMEDIATE DANGER:

1) Approach tortoise slowly and quietly from the front.
2) Place one hand to the rear between the upper and lower shells and one hand on shell behind head.
3) With two fingers, press firmly on base of tail; apply pressure up and toward head. If tortoise is 4 inches long or less do not press on tail.
4) Lift tortoise slowly and gently; move it to a safe place, preferably in the shade of a shrub.

Mark the location where you found the tortoise and where you moved the tortoise. Tell your supervisor immediately.

IN ALL CASES DO NOT FEED, POKE OR THROW OBJECTS AT A DESERT TORTOISE. DESERT TORTOISES ARE PROTECTED BY LAW.

SOURCE: VCR MINING PROJECT FINAL EIR/EA
BLM, EL CENTRO RESOURCE AREA 1987

FIGURE 5.5.2

EMPLOYEE AND CONSTRUCTION WORKER PROCEDURE CARD

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

5.5.1.2 Operations Impact on Wildlife

1. The potential for direct or indirect impacts to animals would be proportional to the level of activities associated with the proposed action. Eight areas of potential operations impacts have been identified: (1) potential ingestion of cyanide solution, (2) water use, (3) traffic access road, (4) introduction of artificial lighting, (5) wildlife guzzler disturbance (6) increased noise levels, (7) potential increase in ravens, and (8) raptor electrocution.

Cyanide Solution

1. The proposed heap leach mining process would use a weak solution of calcium or sodium cyanide to leach precious metals from ore. Ingestion of sufficient quantities of cyanide solution, or prolonged contact with the skin, can result in death. Since animals seeking water could be attracted to ponds holding the cyanide solution, it is a potential hazard to terrestrial and avian wildlife.

2. Terrestrial animals would sense the water and attempt to access the ponds. High-flying migratory, aquatic, and shore birds could be attracted by reflection from the water surface. In addition, night-flying animals such as bats and nighthawks drink on the wing and could be attracted to these areas of potential water sources. A list of terrestrial wildlife and resident and migratory birds is presented in Appendix C.

3. To minimize exposure of animals to cyanide solution, the Applicant has incorporated several measures in the preliminary project design. Specific measures to be employed would be tested for their effectiveness in an ongoing evaluation program after commencement of operations.

   - Solution Ponds

     - Fencing - Terrestrial animals would be protected from solution ponds by fencing. Plans include providing chain link fencing to exclude large animals. Small animals could be excluded by extending material such as hardware cloth or sheet metal around the base of the fence. This could also be extended below ground level to exclude burrowing animals.
     - Netting - Birds and bats would be protected by enclosing the ponds with close-spaced (1-inch or less) mesh netting or, as an alternative, liner material floating on the surface of the ponds. Such covers would be arranged to avoid potential exposure at the edges of ponds.

- Heap Leach Piles

  - Distribution of solution over the leach piles is often accomplished with standard irrigation sprinklers. This aerial spraying can result in ponding on the surface, thereby enabling birds or animals to drink or bathe in the solution. In view of this concern, and for water conservation, the Applicant has revised solution application plans to use recently developed drip irrigation methods to distribute solution directly onto the heap surface, with a much lower incidence of ponding. Irrigation sprinklers would be limited to the sides of heaps, where no ponding would occur.

- Solution Handling

  - The cyanide solution collection and transport system would operate as a closed circuit, with solution transported from the heap piles to storage ponds and to the processing plant in a system of closed pipes instead of the open ditches. Ditches would be used only to carry heavy storm run-off. This would avoid potential exposure of animals to solution.

These measures may be modified and improved in the future as new techniques for protecting animals from cyanide solution are developed by the mining industry.

4. Implementation of the measures set forth above would essentially eliminate wildlife exposure to cyanide solution, and no significant impact is anticipated.

Water Use

1. The proposed operation would use about 725 acre-feet of water annually, extracted from the West Well Field in the northern portion of Lanfair Valley. The perennial water supply at Piute Spring (the only year-round flowing stream in the area) is located at the southeastern limit of Lanfair Valley, approximately 15 miles from the project well field. Piute Spring emanates from ground water sources and provides riparian habitat for wildlife. Concern has been expressed that project ground water withdrawals could greatly reduce or eliminate flow at Piute Spring, and significantly impact the riparian ecosystem downstream from the spring. A small population of bighorn sheep (between three and eight individuals) uses the spring area as habitat (see Section 4.5.2.3, Desert Bighorn Sheep) and could be affected if the spring flow were to be substantially reduced.

2. The potential impact of project ground water extraction on Piute Spring has been investigated in detail and is summarized in Section 5.3, Water Resources. The results indicate that no noticeable effects from pumping 725 acre-feet of water annually would occur at Piute Spring

during the pumping period or in the future as the basic aquifer returns to equilibrium. No significant impact to wildlife or the riparian habitat is anticipated, either during the operating phase of the mine, or at any time thereafter.

Traffic

1. Vehicle traffic on desert roads is known to impact wildlife. The degree of impact is a function of various factors, including the particular wildlife species, average travel speed, road width and age, and traffic volume. The primary wildlife concern for roads accessing the project site is the desert tortoise because roads in Ivanpah and Piute Valleys cross through crucial desert tortoise habitat. While other wildlife along roads would also be potentially affected by project and other traffic these species are generally abundant and/or of widespread distribution. The indirect effect of road-killed wildlife on raven populations, and the potential for increased raven predation on the desert tortoise, is addressed later in this section under "Ravens."

2. Tortoise habitat and population densities in Piute and Ivanpah Valleys, as studied by Berry (1984), are shown in Figure 4.5.1, Desert Tortoise Habitat and Proposed Access Roads. Crucial habitat areas are also shown, as defined by BLM management plans for these areas. Concern has been expressed that project traffic on roads through these valleys, in addition to existing traffic and future recreational traffic, could increase the impact to these desert tortoise populations. The proposed Searchlight Access Route would use, in part, Clark County Road A68P. This graded dirt road crosses low-density (0 to 50 tortoises per square mile) tortoise habitat at the northern limits of the Piute Valley crucial tortoise habitat (BLM, 1983). The proposed Ivanpah Access Route would use, in part, Ivanpah Road (maintained by County of San Bernardino). This paved road crosses desert tortoise habitat ranging from low density to high density (0 to 250 tortoises per square mile) within areas defined as crucial tortoise habitat (BLM, 1980).

3. The impact of roads on desert tortoise populations was studied in the western Mojave Desert by Nicholson (1978). Roads were studied with various traffic levels (from 140 ADT to 17,700 ADT), various widths (two to four lanes), and various ages (3 to 46 years). Field studies revealed that tortoise densities are reduced adjacent to roads, presumably as a result of mortality from vehicular collision or from removal by passing motorists. It was also found that, of the parameters examined, the most significant correlation to tortoise decline was road age. "Apparently the newer roads (less than 15 years) have not existed long enough to affect tortoises more than 0.4 kilometer (1/4 mile) away, whereas the older roads may have reduced

tortoise numbers up to about two kilometers (1 1/4 miles) away" (Nicholson, 1978). It has been suggested that over time, repopulation of affected areas adjacent to roads probably occurs as tortoises move from higher density population areas farther from the road, especially in high quality habitat. Thus, road traffic and immigration result in continued impact to desert tortoise populations. While the Castle Mountain Project would not construct any new roads in crucial desert tortoise habitat, the project's traffic would, unless mitigated, cumulatively affect the tortoise populations in conjunction with other existing and future traffic on these roads.

4. Nicholson's data indicate that age of the road and amount of traffic can be important in the measure of continued impact on desert tortoise populations along roadways. Areas of tortoise populations in the Ivanpah and Piute Valleys are traversed by various paved and unpaved roads (see Figure 4.5.1). According to San Bernardino County, Ivanpah Road has a traffic level of 180 ADT. Clark County Road A68P traffic is estimated at about 10 ADT based upon observations for this study. The Ivanpah Road is 53 years old (Cooley, 1988), and Clark County Road A68P is 38 years old (Loberg, 1988). These data are summarized in Table 5.5.1, Access Road Characteristics and Desert Tortoise Density. Nicholson's study suggests that tortoise densities along each of these roads have been, and are being, impacted. If traffic on these roads were to substantially increase, an increase in tortoise mortality could occur. The level of mortality would depend upon the existing degree of impact and the population density.

5. Potential impacts to the desert tortoise and other roadside wildlife would be expected to occur for the approximately 10-year life of the project, at which time project-related traffic would cease on both routes and road improvements for the Searchlight Access Route would be reclaimed. The impacted wildlife populations would then begin to repopulate to their pre-impact densities. The Applicant has attempted to limit project traffic and potential impacts to the tortoise to the degree possible through a proposed program to use buses or vans to transport employees. As described in Chapter 3.0, Description of the Proposed Project and Its Alternatives, the bussing of employees would reduce operations traffic by nearly 70 percent to about 108 ADT. These trips would be expected to be distributed as about 32 ADT on the Ivanpah Access Route and 76 ADT on the Searchlight Access Route. The Applicant would also attempt to reduce traffic impacts to the tortoise through employee instruction with regard to proper travel speeds and consideration of wildlife.

TABLE 5.5.1

ACCESS ROAD CHARACTERISTICS AND DESERT TORTOISE DENSITY

	ROAD CHARACTERISTICS			TORTOISE POPULATION		
	CURRENT TRAFFIC (1) ADT (MAX.)	ROAD WIDTH	ROAD AGE (2)	TORTOISE DENSITY (3)	HABITAT CROSSED (4)	ANTICIPATED EXISTING ROAD IMPACT (5)
Ivanpah Access Route						
Ivanpah Road	180	28 feet	53 years	0 to 250/sq. mi.	11.4 miles	Moderate
Searchlight Access Route						
County Road A68P	10	14 feet	38 years	0 to 50/sq.mi.	4.2 miles	Low

(1) Ivanpah Road ADT based on County of San Bernardino traffic counts, August 1988. County Road A68P ADT estimate based upon observations.

(2) Road ages calculated from date counties assumed maintenance responsibility.

(3) Tortoise densities from Berry, 1984.

(4) See Figure 4.5.1 for habitat crossed. Ivanpah Road habitat calculation is from south of the junction of Ivanpah Road and Route 164.

(5) Anticipated existing impact to desert tortoise population along roadway based upon Nicholson (1978).

6. To further reduce the potential for impact to tortoise populations beyond that which would be realized by limiting project traffic volumes and speed restrictions, BLM would require the Applicant to construct tortoise-proof fencing along portions of the access routes through crucial habitat. Tortoise-proof fences constructed parallel to roads with culvert underpasses have been recommended by BLM on eighteen roads (including Ivanpah road) passing through crucial habitat in the CDCA (BLM, 1988d). Baseline studies of the desert tortoise populations adjacent to fenced areas would be completed prior to fencing, and monitoring tortoise populations to assess the effectiveness of fencing and culverts would be completed by the environmental specialist or contracted consultant in annual surveys during the life of the project. As a permanent feature, such fencing would actually mitigate the impact of other traffic for the long term and improve the habitat since it would prevent kills by other vehicles and would allow for tortoises to safety repopulate ares adjacent to roads, thereby reclaiming that portion of their habitat. In this manner, the project wold not contribute to the cumulative impact to the desert tortoise decline and would reduce the overall cumulative impact from other sources.

7. The length of fencing to be constructed by the Applicant would be determined by BLM based upon the length of road through crucial habitat, tortoise densities, and portion of project traffic relative to existing road traffic. The construction of this tortoise-proof fencing would mitigate the project's potential traffic impact on the desert tortoise. Specific fencing lengths, height (above and below ground), locations, culvert designs, and construction standards would be developed based upon recommendations and specifications acceptable to BLM. Maintenance of fencing for damage, such as from cattle or storm flows, would be the responsibility of the Applicant during the life of the project. At the discretion of BLM, funds equivalent to the calculated fencing construction costs could be contributed as an alternative to fencing, for use in habitat enhancement, land acquisition, or studies to benefit the desert tortoise.

<u>Lighting</u>

1. The proposed action would require lighting for those portions of the facilities that would operate on a 24-hour basis. This condition would attract some animals, such as bats, to the area to feed on insects attracted to the lights. The potential impacts to nocturnal (active by night) wildlife would be similar to that for diurnal (active by day) wildlife and would primarily be related to exposure to process solution. For example, if it were exposed, bats could drink solution in flight at the surface of the storage ponds. This potential impact would be mitigated

through the use of pond covers (described in more detail later in this section). In addition, the Applicant proposes to minimize fugitive lighting where possible by using directed and shielded lighting.

Guzzler Relocation

1. Two BLM wildlife guzzlers are located on sites which could be indirectly affected by project operations. Nearby human or vehicular activities could inhibit wildlife from using the guzzlers. These guzzlers, which include one near the Searchlight Access Route, and one (#B-79) near the project site, would be relocated at the Applicant's expense, in accordance with BLM guidelines. This would reduce the attraction of wildlife to the area of activities.

Noise

1. As identified in Chapter 3.0, Description of the Proposed Action and Its Alternatives, the mining operation would use a number of procedures to remove, distribute, and process ore. These procedures would generate noise, some of which would be of considerable intensity at the source. Blasting would occur in the mine pits. Ore loading and hauling vehicles would create vehicle noise between the mine pits, overburden pile, and crushing area. The crushing and conveying circuit and the electrical generating equipment would also generate noise. This is a largely unavoidable impact of the project.

2. Studies have shown that many desert wildlife species are sensitive to loud noises (Brattstrom and Bondello, 1983). Some animals, such as kangaroo rats and lizards are rendered temporarily deaf when subjected to excessive noise. This can result in increased predation of these animals by snakes and coyotes, reducing their onsite densities. In addition, project noise may interfere with animal communication noises (such as courtship and territorial vocalizations by birds). It is possible that this could influence reproductive success, but the few studies that have been done on this subject have been poorly designed and inconclusive.

3. Noise is attenuated by distance, atmospheric conditions, and topography, so that the primary effects of project noise would be limited to the immediate source area. The majority of noise effects are expected to be minimal within one quarter mile and negligible within one mile of the site (Brattstrom and Bondello, 1983). No substantial effect on wildlife in the area is expected as a result of noise.

Ravens

1. Concern has been expressed that activities associated with the project and increased project-related and public traffic could lead to increases in the regional population of the common raven. Ravens are active carnivores that prey upon a wide variety of live animals including small mammals, birds, bird eggs, reptiles, amphibians, fish, and newborn livestock. They will also eat fruit and insects, which are seasonally important. They are also carrion-eating scavengers and will eat garbage when available. Carrion is a consistent food source for ravens throughout their range. Carrion sources include road-killed and winter-killed wildlife, other predator kills, stillborn livestock, carcasses left by hunters and, other sources (BLM, 1989). Areas of garbage accumulation are normally included in ravens daily foraging activities. If increased human activities provide these additional food sources, an increase in local raven population could occur.

2. Concern for the growth of raven populations has been expressed because ravens have been known to use tortoises for food. Ravens have apparently preyed on juvenile tortoises for years, but excessive or abnormally high rates of consumption have been recently noted (BLM, 1989). Once a raven family group presents a search image for a specific food item, this behavior can be transferred by social facilitation to other individuals, causing an impact on the available prey. In some areas of the western Mojave Desert, for example, ravens have been found to consume large numbers of young tortoises, from hatchlings up to six years of age. Observations by BLM staff also indicate this behavior occurs in the eastern Mojave Desert. This predation may have an impact on the population dynamics of the affected tortoise population (Berry, 1988). The BLM is currently addressing the issue of raven predation and has prepared an Environmental Assessment for selective control of individuals in the vicinity of tortoise populations (BLM, 1989).

3. It is expected that increased project traffic would increase the risk of mortality to individual animals crossing access roads. This would primarily be expected on Ivanpah Road, where the paved access would permit high travel speeds. Project-related traffic volumes would be minimized by the use of bus/van pools. Ivanpah Road traffic would be about 32 ADT and Searchlight Access Route traffic would be about 76 ADT. The level of public recreational traffic that may increase through provision of improved access along the Searchlight Access Route is unknown. The degree to which additional traffic in the area could increase road kills, and whether or not the availability of additional road kills would attract more ravens to the area (either permanently or temporarily) cannot reasonably be predicted. If it were to occur, it

would not be a certain conclusion that it would result in an increase in predation on young tortoises. Movement, nesting, territory size, density, and season may all affect raven behavior. There is insufficient data on such behavior in the Mojave Desert, and BLM is currently studying raven populations to assemble this data. Raven populations on and approaching the project site would be monitored by the project environmental staff and reported to BLM to augment data being collected elsewhere in the Mojave Desert in an effort to address the problem of raven predation on the desert tortoise.

4. Because ravens are attracted to areas of garbage accumulation, the Applicant would be required to monitor and clean-up project trash. All refuse would be temporarily stored onsite in closed containers prior to landfill disposal so as not to attract ravens to the area.

Raptors

1. As discussed in Section 4.5.1.3, Birds, several raptors (falcons, eagles, vultures, hawks and owls) are expected to occur within the region. An immature golden eagle was observed in Lanfair Valley by Gould (1987b) about three miles south of the proposed project site.

2. Raptors are basically opportunistic and will use power lines and support structures for a number of purposes, especially perching and nesting. The heaviest use is as hunting perches. Studies have shown that raptors can be electrocuted by powerlines; immature or sub-adult birds are the most susceptible (BLM, 1981).

3. The proposed project would use electric power poles for distribution of power from the generators to onsite uses and offsite to the West Well Field. These power distribution lines would therefore be designed for raptor safety in accordance with "Suggested Practices for Raptor Protection on Power Lines" (BLM, 1981).

5.5.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. If the proposed improvements to the westerly 10.8-mile segment of the Searchlight Access Route were not approved, most workers and project vehicles would use the Ivanpah Access Route and the total traffic on that route would increase to about 102 ADT. About six trips per day would still be anticipated on the unimproved Searchlight Access Route, due to some employees accessing the site from the Searchlight direction.

2. Relative to the proposed action, there would be few, if any, impacts to the Piute Valley desert tortoise population with this alternative, since the Searchlight Access Route would not be used. No tortoise fencing would be constructed along Clark County Road A68P. This redistribution of traffic would result in a greater anticipated impact to the Ivanpah Valley tortoise population along Ivanpah Road and the Applicant would be required to extend the proposed length of tortoise fencing to be constructed based upon the additional portion of road traffic. This would effectively mitigate the project's contribution to the cumulative impact on the desert tortoise.

3. No significant habitat or wildlife impact would be expected for construction of the natural gas pipeline along the Searchlight Access Route Alignment.

5.5.3 NO ACTION ALTERNATIVE

1. If this alternative were to be implemented, the direct impacts to onsite habitat and the direct and indirect impacts to onsite and offsite wildlife anticipated for the proposed project would not occur. No tortoise-proof fencing would be constructed and traffic would continue to impact the tortoise populations. No mitigation measures for the project would be necessary.

5.6 AIR QUALITY

1. Existing air quality at the Castle Mountain Project site would be affected by fugitive dust and fuel use emissions generated during project operations. Impacts would be considered significant if one or more of the following were to occur:

   - Violation of an ambient air quality standard
   - Substantial contribution to an existing or projected air quality violation
   - Exposure of sensitive receptors to substantial pollutant concentrations

2. This section identifies the sources and quantities of air contaminants expected from project operations. Potential air quality impacts are assessed with respect to State and Federal ambient air quality standards, San Bernardino County Air Pollution Control District (SBCAPCD) rules and regulations, and worker safety regulations.

3. The data and analysis provided herein are summarized from a detailed air contaminant emissions inventory prepared by URS Consultants, Inc. as part of the Castle Mountain Project Authority to Construct (ATC) Permit Application, submitted to SBCAPCD. This ATC has been included as Appendix F, and contains background on the emission factors used and operational parameters assumed in compilation of the Castle Mountain Project air pollutant emissions inventory.

5.6.1 PROPOSED ACTION

1. The proposed Castle Mountain Project has the potential to generate air contaminants as a result of mining activities, ore processing operations, haul road travel, vehicular exhaust, stationary internal combustion engine exhaust, and use of reagents. This section is organized to discuss these sources according to the following format:

   - 5.6.1.1 Onsite Emissions Inventory
     - This section quantifies the potential air contaminant emissions from all project-related operations.
   - 5.6.1.2 Local Air Quality Impacts
     - This section evaluates the potential for project-related emissions to adversely impact air quality in the vicinity of the proposed project site.

- 5.6.1.3 Access Road Considerations
  - This section discusses analyses completed to determine the potential for dust emissions associated with project-related traffic along the proposed access routes to adversely affect local air quality.
- 5.6.1.4 Hydrogen Cyanide Considerations
  - This section evaluates worker-related safety with respect to possible hydrogen cyanide (HCN) formation during the heap leaching process.

5.6.1.1 Onsite Emissions Inventory

1. The Castle Mountain Project would generate air contaminant emissions in the form of fugitive dust and gaseous pollutants from a variety of activities, including:

- Material removal
  - Dust emissions from drilling and blasting operations and loading of ore and overburden onto haul trucks.
- Haul road travel
  - Dust emissions from transport of ore and overburden to stockpiles and ore processing facilities.
- Dumping
  - Dust emissions from dumping ore and overburden at stockpiles and ore processing facilities.
- Ore processing
  - Dust emissions from crushing and screening ore to achieve optimum leaching potential.
- Conveyor transfer points
  - Dust emissions from transferring ore between conveyors within the crushing and screening circuit.
- Silos, material delivery and use
  - Dust emissions from the delivery of lime, cement and calcium or sodium cyanide, and addition of these materials.
- Wind erosion
  - Dust emissions from overburden and ore stockpiles.

- Stationary internal combustion engines
  - Gaseous pollutant emissions from the stack exhaust gases generated by electrical power generators, heaters, and kilns.
- Mobile equipment
  - Gaseous pollutant emissions from the exhaust of haul trucks, loaders, dozers, scrapers, and other vehicles.

2. Table 5.6.1, Castle Mountain Project Air Pollutant Emissions Inventory, displays a summary of air contaminant emissions for each of the emission source categories mentioned above and for each of the five U.S. Environmental Protection Agency's (EPA) "criteria" pollutants:

   - Reactive Organic Compounds (ROC)
   - Nitrogen Dioxide (NO_2)
   - Sulfur Dioxide (SO_2)
   - Carbon Monoxide (CO)
   - Particulate matter less than 10 micrometers aerodynamic diameter (PM_{10}). PM_{10} can be emitted from mining operations in the form of either fugitive dust (i.e., from haul road traffic, wind erosion), or exhaust from fuel combustion in motor vehicles or stationary internal combustion engines.

3. Table 5.6.1 reports nitrogen oxides (NO_x) emissions, rather than NO_2 because standard air pollution emission factor references normally document NO_x emissions from fuel combustion sources, but not NO_2. In most cases, stack exhaust is in the form of nitric oxide (NO) that does not convert to NO_2 until long after it has drifted downwind of the emission point. Thus, it is a conservative approach to assume that 100 percent of the estimated NO_x emissions from a fuel combustion source are emitted as NO_2. Air quality modeling techniques may be employed to estimate the downwind conversion of NO_x to NO_2. This topic is discussed in detail in Appendix F.

4. Air contaminant emissions of NO_x attributable to the electrical power generators, as summarized in Table 5.6.1, are of sufficient magnitude to require that San Bernardino County's New Source Review (NSR) guidelines be followed in evaluating potential impacts of the proposed project upon local air quality. As a result, SBCAPCD regulations require that Best Available Control Technology (BACT) be employed on all sources of NO_x emissions to reduce potential impacts to the greatest possible extent. In addition, as outlined in Appendix F, San Bernardino County NSR regulations pertaining to TSP and PM_{10} are ambiguous as to which particulate standard should be evaluated in determining NSR

TABLE 5.6.1

CASTLE MOUNTAIN PROJECT
AIR POLLUTANT EMISSIONS INVENTORY

SOURCE	EMISSION RATES											
	POUNDS PER DAY (PEAK)						TOTAL TONS PER YEAR					
	ROC	NO_x	SO_2	CO	PM_{10} Combustive	PM_{10} Fugitive Dust	ROC	NO_x	SO_2	CO	PM_{10} Combustive	PM_{10} Fugitive Dust
Diesel Powered Generator	17.2	297.4	77.3	172.5	63.0	--	3.1	54.3	14.1	31.5	11.5	--
Propane Powered Generator	99.5	678.1	0.5	316.5	2.3	--	18.2	123.8	0.1	57.8	0.4	--
Propane Fired Equipment	0.9	16.6	0.0	3.4	0.3	--	0.2	3.0	0.0	0.6	0.1	--
Mobile Equipment	92.3	2,462.8	200.0	525.5	76.8	--	14.5	386.0	31.3	82.3	12.2	--
Material Removal	--	--	--	--	--	84.7	--	--	--	--	--	12.9
Haul Road Travel	--	--	--	--	--	33.9	--	--	--	--	--	5.1
Dumping	--	--	--	--	--	29.0	--	--	--	--	--	4.4
Ore Processing	--	--	--	--	--	105.0	--	--	--	--	--	14.3
Conveyor Transfer Points	--	--	--	--	--	5.7	--	--	--	--	--	0.8
Silos Material Delivery, and Use	--	--	--	--	--	0.2	--	--	--	--	--	<.1
Wind Erosion	--	--	--	--	--	12.0	--	--	--	--	--	2.14
TOTAL EMISSIONS	209.9	3,454.9	277.8	1,017.9	142.4	270.5	36.0	567.1	45.5	172.2	24.2	39.6

Source: Castle Mountain Project, Authority to Construct Permit Application, URS Consultants, Inc., 1989 (Appendix F).

applicability. Since TSP emissions from the proposed ore processing facility exceed 250 lb/day (see Appendix F), it was assumed that SBCAPCD BACT requirements would also apply to particulate emissions from the ore processing facility.

5.6.1.2 Local Air Quality Impacts

1. Air quality modeling analyses were performed in an effort to determine whether Castle Mountain Project emissions have the potential to contribute to adverse downwind air resources impacts. This section presents the results of these analyses and briefly discusses the assumptions and methodology used in performing the analyses.

2. Castle Mountain Project emissions, as summarized in Table 5.6.1, are of two principal classes: fugitive dust and combustive emissions. Fugitive dust sources are spread throughout the project site (generally termed area sources), while combustive emissions are vented through discrete stacks and exhausts ports (generally termed point sources). The dissimilar dispersion characteristics of the above sources required that fugitive dust impacts be analyzed via a different modeling technique than that used for combustive emissions.

3. Fugitive dust impacts were evaluated with EPA's Industrial Source Complex Model - Short Term version (ISCST). Combustive emissions impacts were assessed using the EPA Gaussian dispersion model MPTER for all points at which terrain was below the lowest stack height, and the EPA Gaussian dispersion model COMPLEX I for all points where terrain was equal to or above the lowest stack height.

4. In order to generate a worst-case scenario, the assessment for the modeled pollutants is based on maximum estimated emission rates and monitored meteorological data. If the ambient impact assessment for worst-case conditions would not result in a violation of clean air standards in the area, then emission dispersion patterns under more normal conditions would not result in unacceptable impacts.

5. As indicated in Table 5.6.2, Castle Mountain Project Air Quality Modeling Results, for stationary sources the largest pollutant would be NO_x from the fossil fuel burning equipment. Since the other gaseous pollutants would be produced in much lower quantities, NO_x was used as the indicator pollutant for adverse combustive emissions impacts.

TABLE 5.6.2

CASTLE MOUNTAIN PROJECT
AIR QUALITY MODELING RESULTS

AVERAGING PERIOD	FUGITIVE DUST (PM_{10})					COMBUSTIVE EMISSIONS (NO_2)				
	CONCEN-TRATION (1) ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)	NAAQS (μgm^3)	PERCENT OF CAAQS	PERCENT OF NAAQS	CONCEN-TRATION (2) ($\mu g/m^3$)	CAAQS ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)	PERCENT OF CAAQS	PERCENT OF NAAQS
1 Hour	--	--	--	--	--	272	470	--	58	--
24 Hours	45.1	50	150	90	30	--	--	--	--	--
Annual	21.7	30	50	72	43	29	--	100	--	29

(1) Includes background concentration of 18 $\mu g/m^3$.
(2) Includes a maximum 1-hour background concentration of 3 $\mu g/m^3$ and a maximum annual background concentration of 11 $\mu g/m^3$.

CAAQS: California Ambient Air Quality Standards.
NAAQS: National Ambient Air Quality Standards.

6. The results of air quality modeling analyses conducted for both fugitive dust and combustive emission sources are summarized in Table 5.6.2. Results summarized in this table have been compiled for fugitive dust (PM_{10}) for the 24-hour and annual averaging periods and for combustive emissions (NO_2) for the 1-hour and annual averaging periods. Results have been presented in this manner to enable comparison with ambient air quality standards. As discussed in Section 5.6.1, modeled downwind NO_x impacts were converted to NO_2 for comparison to applicable State and Federal standards. Detailed background on the method used to perform this conversion is presented as part of Appendix F.

7. Results of the fugitive dust (PM_{10}) modeling exercise, as expressed in Table 5.6.2, show that the maximum potential 24-hour dust impact near or outside the project site is expected to be below the National and California standards. Figure 5.6.1, PM_{10} Impact Contours (24-hour) from Project-related Fugitive Dust Emissions, shows the approximate PM_{10} impact contours, with a maximum PM_{10} concentration of approximately 25 $\mu g/m^3$ along the northern and southern boundaries. The annual averages shown in Figure 5.6.2, PM_{10} Impact Contours ($\mu g/m^3$) (Annual) from Project-related Fugitive Dust Emissions, demonstrate that project impacts are localized at the center of the project site, with concentrations at or beyond the site boundaries at less than 5 $\mu g/m^3$. The concentrations, including background levels, are expressed as a percentage of the California and National Ambient Air Quality Standards, as shown in Table 5.6.2. A complete analysis of the PM_{10} modeling results is contained in Appendix F.

8. Results of the combustive emissions (NO_2) modeling analysis, as summarized in Table 5.6.2, show that neither the National nor State standards are expected to be exceeded as a result of the proposed project. The highest 1-hour and annual averaging periods occurred in elevated terrain approximately 0.5 kilometer southeast of the generators. Figure 5.6.3, NO_2 Impact Contours (1-hour) from Project-related Emissions, shows the incremental NO_2 concentrations as they surround the site, as calculated by the 1-hour analysis. Annual NO_2 concentrations, as calculated by the modeling analysis, are shown in Figure 5.6.4, NO_2 Impact Contours ($\mu g/m^3$) (Annual) from Project-related Emissions.

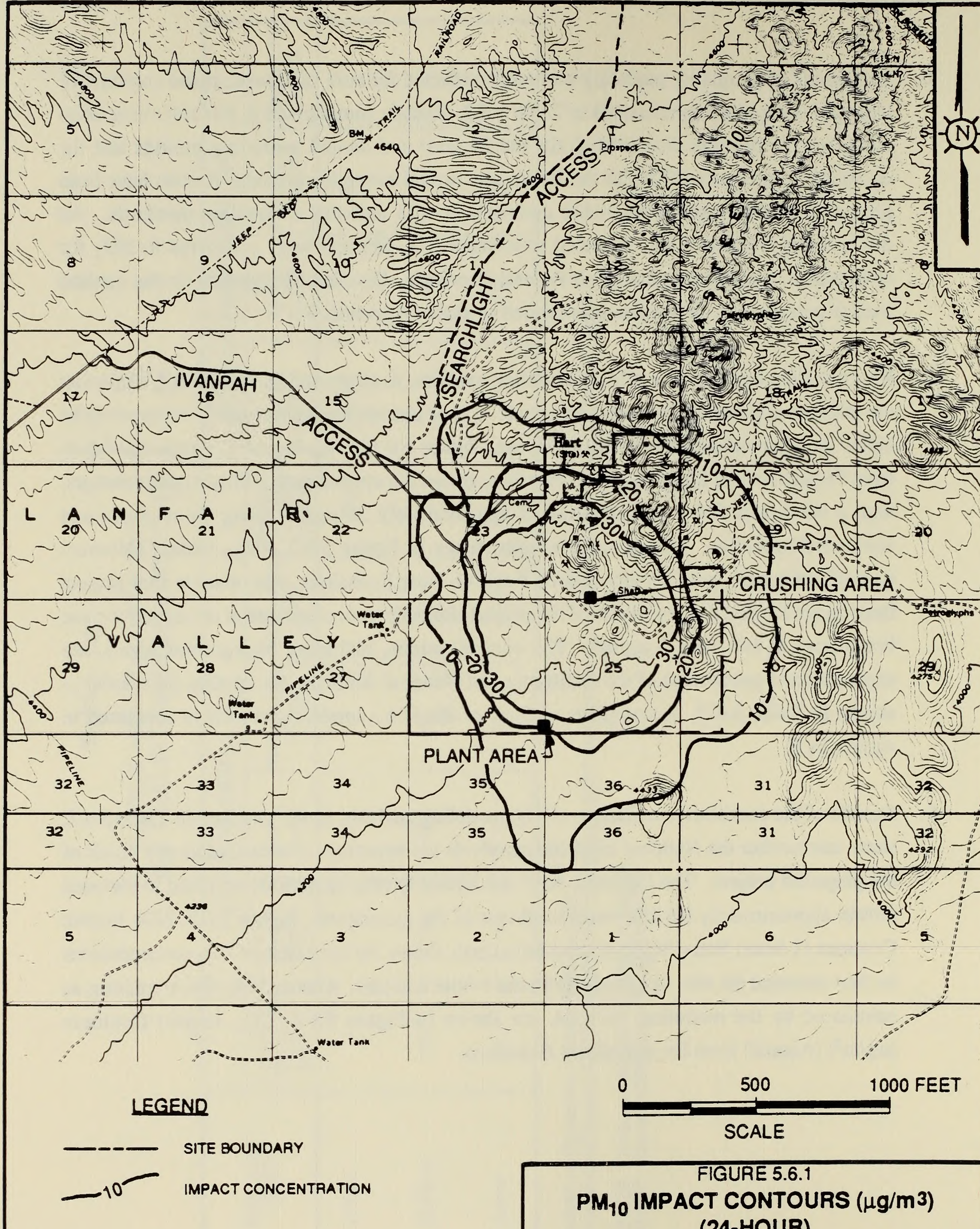


FIGURE 5.6.1
PM_{10} IMPACT CONTOURS ($\mu g/m^3$)
(24-HOUR)
FROM PROJECT-RELATED
FUGITIVE DUST EMISSIONS
CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

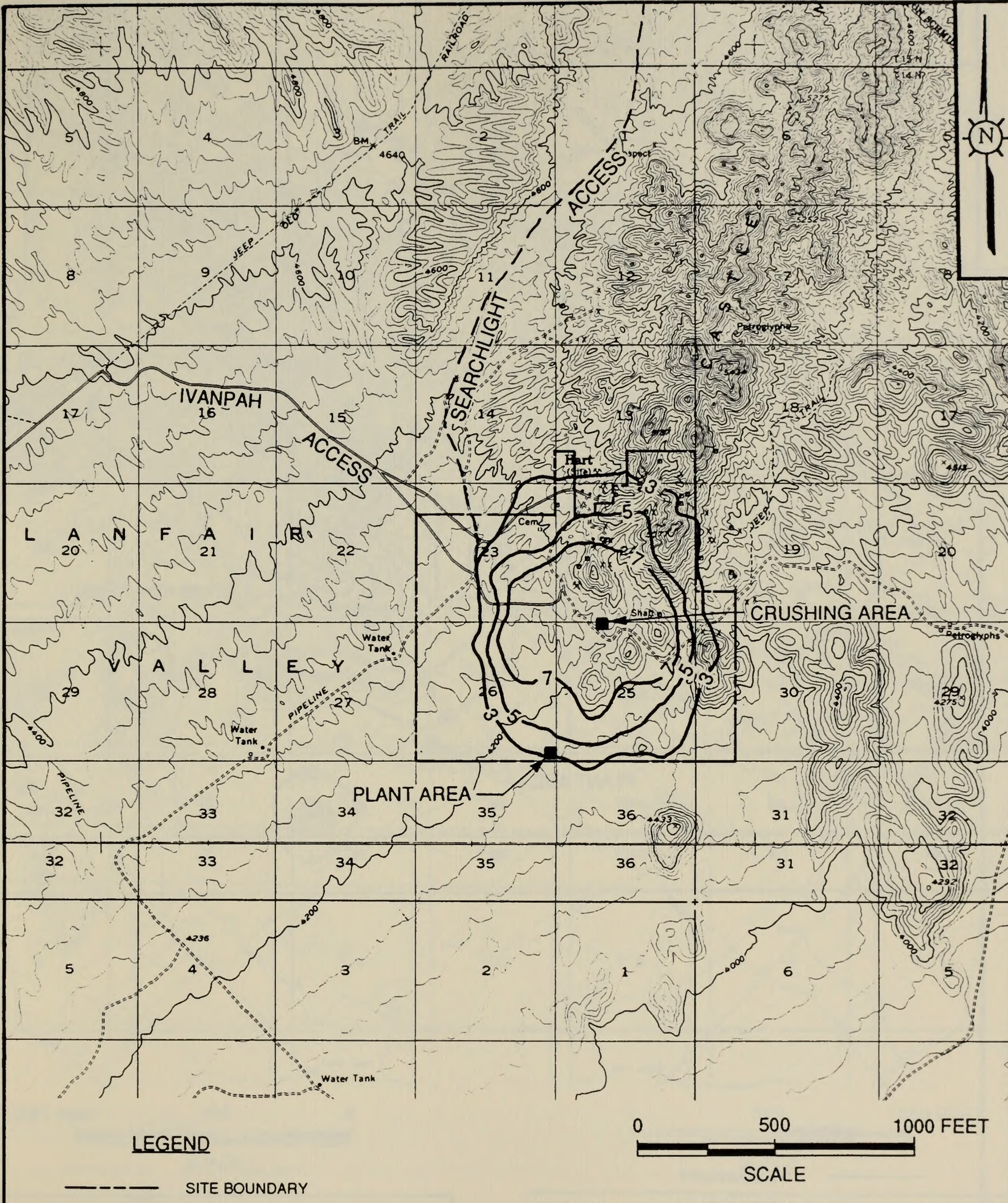
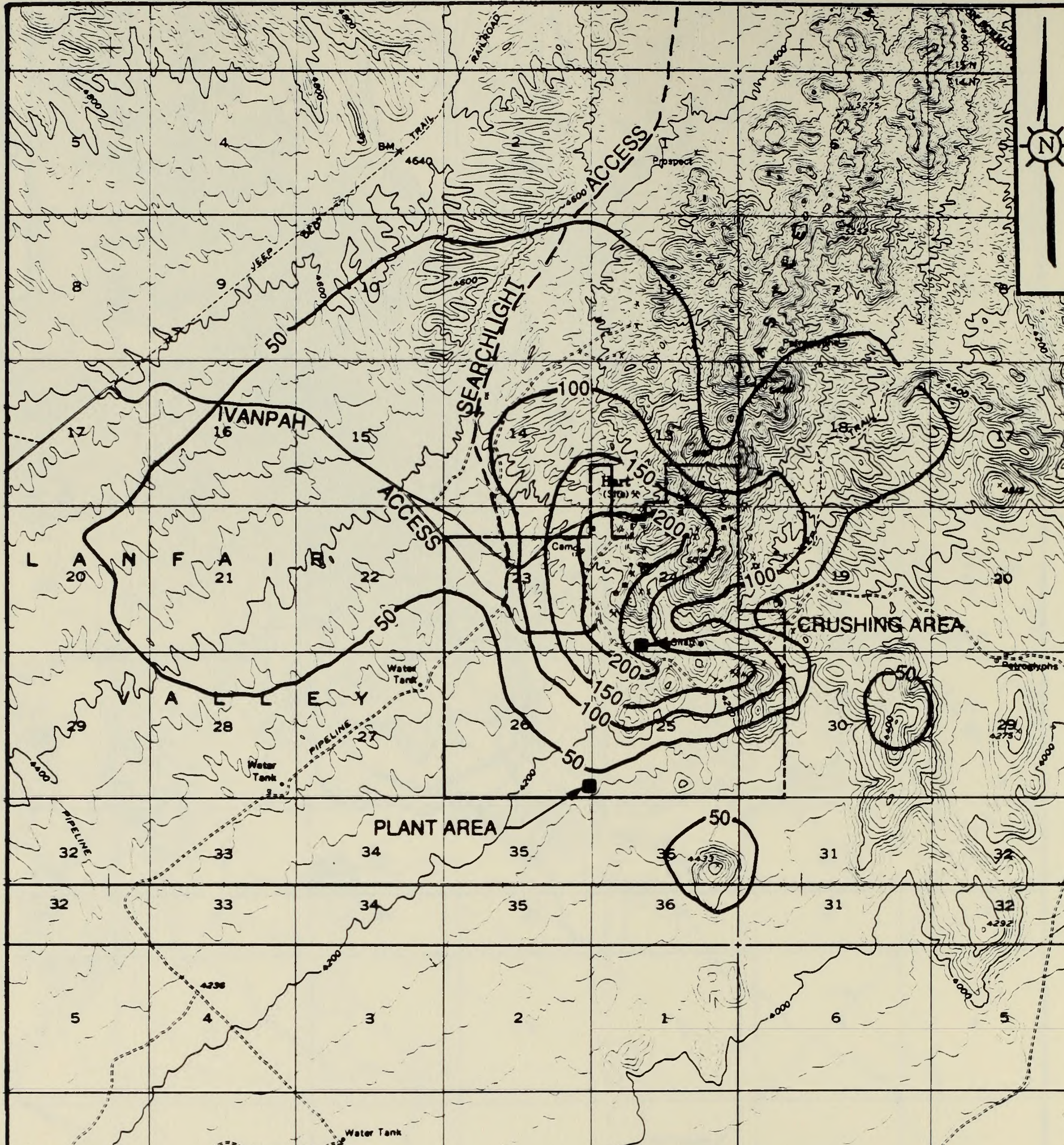


FIGURE 5.6.2
PM_{10} IMPACT CONTOURS (μg/m3)
(ANNUAL)
FROM PROJECT-RELATED
FUGITIVE DUST EMISSIONS
CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

- - - - - SITE BOUNDARY

50 IMPACT CONCENTRATION

0 500 1000 FEET

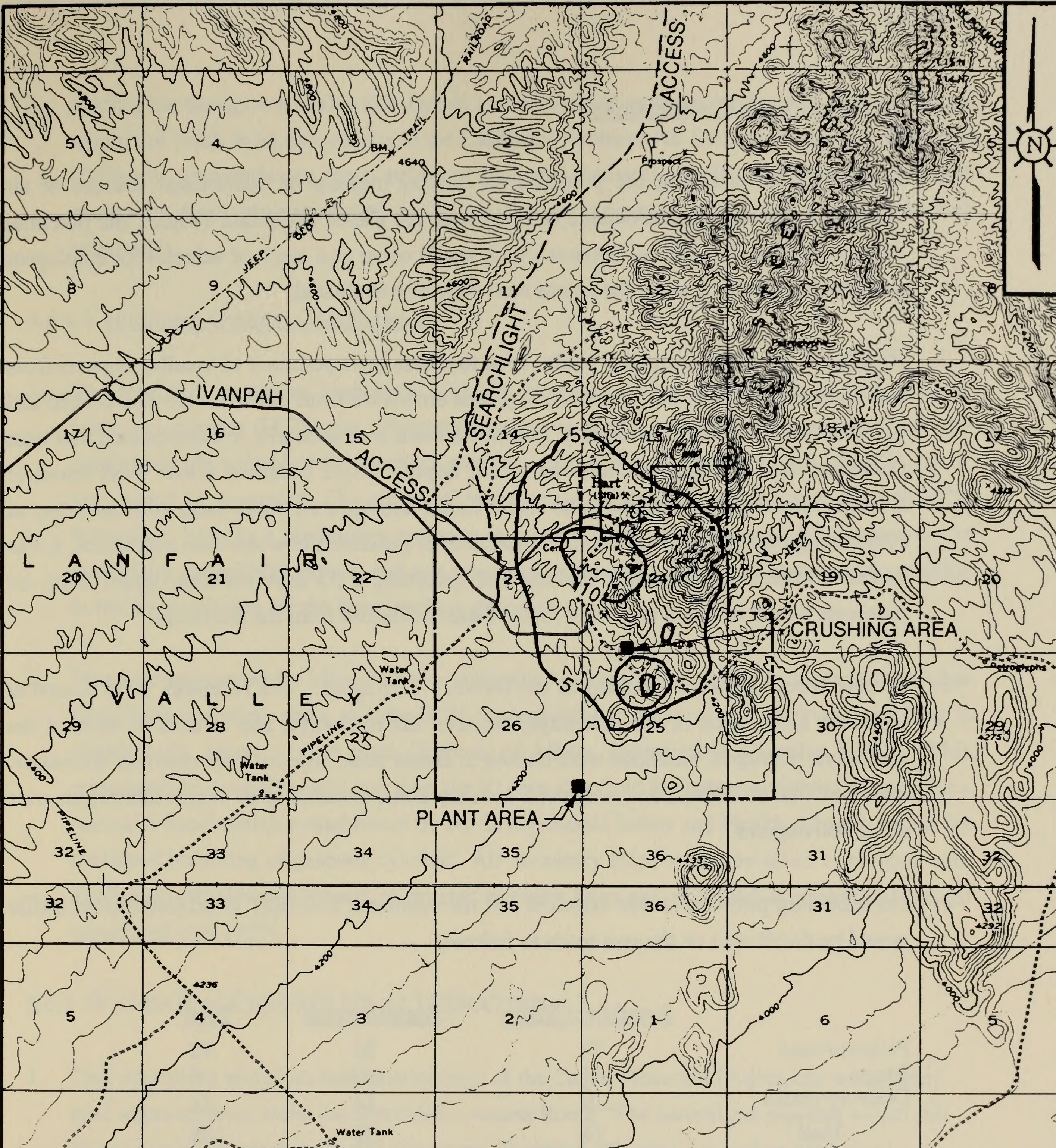
SCALE

FIGURE 5.6.3

NO_2 IMPACT CONTOURS ($\mu g/m^3$)
(ONE-HOUR)
FROM PROJECT-RELATED EMISSIONS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.



LEGEND

SITE BOUNDARY

10 IMPACT CONCENTRATION

0 500 1000 FEET

SCALE

FIGURE 5.6.4

NO_2 IMPACT CONTOURS ($\mu g/m^3$) (ANNUAL) FROM PROJECT-RELATED EMISSIONS

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

5.6.1.3 Access Road Considerations

1. In addition to assessing the potential air quality impacts of operational sources of air contaminant emissions associated directly with the Castle Mountain Project, the potential adverse fugitive dust (PM_{10}) impacts which would occur as a result of vehicles for employees and supplies traveling along the access road were also evaluated.

2. HIWAY-2, an EPA air quality model used to assess inert pollutant air quality impacts from line sources, was selected to model PM_{10} dust emissions from traffic on the Searchlight and Ivanpah Access Routes. In order to generate a worst case scenario, it was assumed that least favorable meteorological conditions would apply. These included a low wind speed of 1 meter/second (2.2 miles/hour) and stable class F atmospheric conditions, with the effect of minimizing dust plume dispersion. In addition, to generate the worst-case conditions, it was assumed that, except for ride sharing and enforcing a 35 mile-per-hour speed limit, no measures would be taken to control fugitive dust emissions from the roadways.

3. Twelve receptors were modeled in the HIWAY-2 analysis. The receptors were placed at locations along each of the roadways, between the roadways, and at ends of each of the roadways. Receptor locations were chosen to assess peak impacts from roadway emissions. This took into consideration wind speed and directions, modeled in 10 degree increments over a full 360 degrees.

4. For modeling purposes it was assumed that the estimated 108 ADT of project-related traffic would be distributed on the two roads as follows:

	Searchlight Route	Ivanpah Route	Total
Pickups/vans	72	20	92
Buses	4	0	4
Delivery trucks	0	12	12
Total	76	32	108

This distribution resulted in concentrations of fugitive dust being higher along the Searchlight Access Route. The modeled 24-hour and annual average incremental PM_{10} concentrations of 26 $\mu g/m^3$ and 6 $\mu g/m^3$ along the Searchlight Access Route were respectively 52 percent and 20 percent of the CAAQS for PM_{10}.

5. Adding the background value (18 $\mu g/m^3$) to the modeled incremental fugitive dust emissions would not result in an exceedance of the California Ambient Air Quality Standards. Since the California standards are more stringent than the National standards, PM_{10} fugitive dust emissions from project-related traffic on the access roads would not violate National standards.

5.6.1.4 Hydrogen Cyanide Considerations

1. The leaching operations associated with the proposed action could result in emissions of hydrogen cyanide (HCN) gas. Potential emissions of this pollutant are minimized through continuous pH control of the leaching solution, such that only trace amounts of HCN gas, if any, would be generated. Control of pH is important to prevent cyanide losses through HCN formation, both as a preventive measure to protect leach pile operators from exposure to potentially unhealthful vapors, and as a means of maintaining the necessary available cyanide in the leach solution for the heap leaching process.

2. Measurements made by Mine Safety and Health Administration (MSHA) inspectors at other heap leach operations show that the HCN concentration in air close to a working leach heap is consistently about 2 to 3 ppm (Bureau of Mines Information Circular 8770). This concentration is significantly less than the 10 ppm threshold limit/time-weighted average for a normal 8-hour workday established by the Occupational Safety and Health Administration for sustained breathing of gaseous cyanide. All necessary steps would be taken to comply with applicable MSHA regulations to protect workers from any potential occupational hazard associated with HCN.

5.6.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include development of the Castle Mountain Project, but would deny road improvements along the Searchlight Access Route. The natural gas pipeline would still be constructed along that general alignment. Project traffic would therefore use existing access routes, primarily Ivanpah Road, for ingress and egress. Since project traffic levels and onsite activities would be the same as for the proposed action, the potential onsite air quality impact would be similar.

2. The traffic distribution for the Ivanpah Access Alternative was modeled using the HIWAY-2 EPA model. For this alternative, it was assumed that all 108 ADT would occur on the

Ivanpah Access Route, with no traffic on the Searchlight Access Route. In this case, the modeled incremental 24-hour and annual average PM_{10} concentrations of 28 $\mu g/m^3$ and 7 $\mu g/m^3$ along the Ivanpah Access Route were respectively 56 percent and 23 percent of the CAAQS for PM_{10}.

3. Adding the background value (18 $\mu g/m^3$) to the modeled incremental fugitive dust emissions would not result in an exceedance of the California Ambient Air Quality Standards. Since the California standards are more stringent than the National standards, PM_{10} fugitive dust emissions from project-related traffic on the access roads would not violate National standards.

5.6.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to air quality would occur in the absence of development.

5.7 ENVIRONMENTAL HEALTH AND SAFETY

1. This section evaluates the potential public health and safety impact that could be associated with the proposed project. The primary health concern expressed in the public scoping process was related to management of chemicals that would be used in the project operation, especially chemicals containing cyanide. The following discussion evaluates this and other potential health and safety concerns as they would relate to the general public, visitors, and mine employees. Safety and protection of wildlife is evaluated in Section 5.5, Wildlife.

2. Project effects would be considered significant if a public health hazard would be created.

5.7.1 PROPOSED ACTION

1. The proposed Castle Mountain Project operation could involve various activities with potential health and safety impacts. The Mine Safety and Health Administration (MSHA) sets forth regulations to be followed during mining activities. These regulations will be adhered to during all operations to ensure employee and visitor safety on the project site. Project activities are evaluated below, including handling of chemicals, storage of hazardous chemicals and explosives, factors in the safe design of project elements and the treatment and disposal of wastes. Reclamation activities will be discussed for measures which would be taken to preclude potential hazards to public health and safety following the operational period.

5.7.1.1 Mining Operations

1. ANFO explosives would be used during mining operations to break and loosen overburden and ore in the mine pits. Once loosened, the overburden and ore would be loaded into haul trucks for transport to stockpiles or crushers. As much as 16 tons of ANFO would be used per blast, with one blast estimated each day, six days a week. Explosives would be stored in a secured powder magazine constructed and maintained in accordance with Federal and local permit requirements.

5.7.1.2 Processing Operations

Agglomeration

1. Safety procedures would be implemented to prevent hazards which could be associated with the agglomeration of ore in the crushing and conveying circuit. During agglomeration, a barren solution is added to enhance gold extraction. To preclude release of solution to unprotected soils, the agglomeration facilities will be located over impervious liners.

Heap Leach Process

1. Potential release of chemicals used for the heap leach and gold stripping process could occur during operations. The heap leach system would consist of the heap leach pads, where ore is leached, and solution ponds where cyanide solution is contained. The heap leach pads and solution ponds would be lined with impermeable liners placed over graded and compacted soil. These liners would be designed to meet requirements of the Regional Water Quality Control Board (RWQCB), Colorado River Basin, which include specific standards on liner permeability. The conveyance system for cyanide solutions would be contained within closed pipes to preclude potential release of solution. Design requirements of the ponds also include sizing to accommodate additional run-off which could occur from large storm events. The ponds would be sized to accommodate this additional drainage from the impermeable heap leach pads, and from the precipitation that would fall directly into the ponds as the result of such a storm.

2. A recently developed solution application method using drip irrigation would be employed. Health and safety benefits of direct application by drip irrigation over a conventional sprinkler spray system include reduced solution evaporation during heap leach application and reduced exposure of solution to the environment. The leach process would be designed as a zero-discharge system, that is, solutions are recycled. Sodium hydroxide or lime would be added to the cyanide solution to keep the pH of the solution at 10 or higher. When the pH of cyanide solution is kept high, the vapor pressure of the dissolved hydrogen cyanide is reduced and the chance of hydrogen cyanide volatilizing to the air is substantially lowered. After the final leaching has been completed, the ore heap would be decommissioned according to BLM and RWQCB procedures. The heap would be rinsed to reduce the residual cyanide content to the level stipulated by the RWQCB Permit, using fresh water or a neutralizing solution.

Cyanide Solution

1. Cyanide has been used in various processing methods to extract gold from ore for over 100 years. The technology of using a dilute sodium cyanide solution to heap leach gold from relatively low grades of ore was primarily developed in the early 1970s. Commercial applications of the technology started in the late 1970s and has grown rapidly because it is the only economically feasible method to recover gold from disseminated ore bodies where the gold exists at low concentrations. Presently, there are more than fifty gold mines using heap leach technology in the United States.

2. Although employees at these heap leach mines work in close proximity to the process solutions, there are no known cases of accident or severe illness directly due to this cyanide exposure. This safety record is a result of several factors:

   - Cyanide in the process solutions is of a dilute concentration (less than 500 parts per million).
   - While cyanide is lethal in large single (acute) doses, it does not accumulate in the body as a result of a number of small exposures over time (it has low chronic toxicity).
   - The pH of the solution is maintained above 10.0 so that only very small quantities of hydrogen cyanide (HCN) are present in the vapors.
   - Procedures for the delivery, storage, and addition of cyanide are well established and controlled to avoid human exposure.
   - The Mine Safety and Health Administration (MSHA) requires rigid employee training on the handling of reagents and process solutions and includes provisions for monitoring worker exposure levels.

3. The water quality standard most frequently used for the protection of water quality is a relatively low 0.2 parts per million. The factor of safety for human consumption of potable water at this concentration is very high. Because of this type of criteria, however, the California Regional Water Quality Control Boards (RWQCB) impose stringent engineering and construction requirements on facilities used in containing cyanide solutions. The RWQCB regulations also require that the construction of containment systems be quality-controlled by registered professionals and final operating conditions be monitored, with frequent reporting.

4. In addition to the facilities engineered for containment, protection of water quality is also provided by the reactivity of cyanide, which results in its volitalization into the atmosphere, its natural degradation to nontoxic carbon and nitrogen compounds, and its fixation with the trace

metals in the environment to form less toxic complexes over time. While this natural degradation is a well known phenomenon, the time and travel distance for degradation to occur cannot presently be predicted with sufficient accuracy for all conditions to allow these forms of natural cyanide attenuation to be relied upon as a method of containment. Instead, they represent an unquantifiable level of redundancy toward reducing the potential of exposure from this processing reagent.

Gold Recovery Process

1. Solution from the pregnant pond is piped to the gold recovery plant to remove the gold through a carbon stripping process. The gold recovery plant would be constructed on curbed concrete pads to contain the volume of potential spills from tanks containing cyanide solution. Ancillary storage and containment facilities located at the gold recovery plant would be constructed for the following chemicals used in the process:

   - Sodium or calcium cyanide
   - Sodium hydroxide
   - Cement and lime
   - Acids

   Each storage area would be surrounded by dikes or curbs capable of containing fluids in the event of a spill. In order to ensure proper cleanup for spills, a spill prevention and preparedness plan would be implemented prior to initiation of gold recovery operations. All employees using these chemicals would be thoroughly trained in spill prevention and cleanup procedures.

5.7.1.3 Domestic and Industrial Waste Disposal

1. It is anticipated that the following types of wastes would be generated by the proposed project:

Waste Type	Waste Generated	Disposal Procedure
Domestic waste	Paper Plastic Foods/garbage Glass	Removed to Class III landfill
Industrial waste (non-hazardous)	Tires Metal Wood	Removed to Class III landfill
Industrial waste (hazardous)	Vehicle Oil Solvents Reagent/containers	Recycled or removed to appropriate hazardous waste landfill or treatment facility

2. Wastes would be stored temporarily on the project site in a manner acceptable to County Department of Environmental Health Services (DEHS). Waste oils and other waste hydrocarbon products would be stored in a tank in a contained area. These would be recycled or periodically removed offsite by a licensed waste disposal contractor to an approved recycler or disposal site. Small amounts of waste considered hazardous, such as oils and solvents would be detoxified onsite, recycled or packed, and disposed of according to rules and regulations for waste disposal set forth by DEHS.

3. At some point during the project life, the Applicant may request approvals to dispose of certain non-hazardous wastes within the project overburden pile. The types of materials disposed in this manner would include tires, scrap metals, and wood.

5.7.1.4 <u>Wastewater Treatment Facility</u>

1. A septic tank and leach field system approved by DEHS would be used to dispose of domestic wastewater generated in the area of the processing plant and the mine vehicle maintenance building. It is anticipated that each facility used would have a treatment capacity of about 750 gallons per day. One leach field would be located south of the gold processing plant; the other would be located in the overburden pile. Portable toilets would be used in the area of mine pit operations. Portable toilet wastes would be removed offsite by a contracted commercial hauler.

5.7.1.5 <u>Transport of Chemical Reagents and Fuels</u>

1. Various chemical reagents will be used at the project site. Several of them, including ammonium nitrate, sodium or calcium cyanide, sodium hydroxide, lime, and diesel fuel and propane, will be used in quantity (see Table 3.2.2, Major Operating Supplies). Ammonium nitrate (a fertilizer) would be shipped in granular form in bins or 100-pound bags. Calcium cyanide would be delivered to the site in truckload quantities and would be transferred into a silo in the process plant area, then mixed onsite with water or barren solution. Sodium cyanide would be received in 3,000-pound returnable metal bins or 2,000-pound bags as a solid, then mixed onsite with water or barren solution. Sodium hydroxide would either be delivered as a liquid, or as a solid flake. Calcium hypochlorite would be shipped in 100 pound drums in pellet form. Calcium hypochlorite would be kept on hand to neutralize

cyanide and would be stored in its received form. Cement and lime used in agglomeration would be delivered to the site in truckload quantities and transferred into silos in the agglomeration area. Other chemicals stored onsite would be delivered by truck as required. Trucks containing hazardous chemicals would be properly labeled, and equipped to Interstate Commerce Commission (ICC) specifications. In the event of an accidental spill, these materials could cause degradation to soils, vegetation and surface or ground water unless containment and recovery measures were implemented promptly. In addition, depending on the proximity of people to a spill site, or if the chemicals were to enter the air or surface waters used for human consumption, a spill could adversely affect human health.

2. Measures incorporated into the proposed project's design to contain spills onsite and facilitate cleanup are discussed in Chapter 3.0, Description of the Proposed Action and Its Alternatives. Spills offsite would most likely be caused by an accident involving vehicles transporting the chemicals. The ICC sets standards for the safe transport of hazardous cargos. The Applicant will contract only with suppliers using equipment and procedures approved by the ICC.

3. The Applicant will develop a spill prevention, control, and recovery plan for management of reagents. The plan would include at least the following elements:

   <u>Reagants</u>

   - Types of reagents used
   - Operation, maintenance and safety procedures
   - Emergency planning
   - Local agency arrangements
   - Hazardous material incident reporting
   - Cleanup and detoxification
   - Record keeping
   - Plan implementation and amendment

   <u>Oil Storage</u>

   - Types of oil used
   - Spill containment facilities
   - Operation, maintenance and safety procedures
   - Emergency planning
   - Record keeping

   In addition, all process plant personnel and appropriate management staff would receive training in proper operating procedures and be informed about implementation and use of the

spill prevention plan. The Applicant's personnel could also provide training to local fire and sheriff's department personnel and the California Highway Patrol, who would likely be the first to respond to an accident away from the project site.

4. Reagent suppliers would most likely have warehouse, shipping, and handling facilities in metropolitan areas with access to the Interstate Highway System. Transportation of reagents to the site would be along Interstate 15 to the Nipton exit, then along the Ivanpah Access Route to the project site. In the event of a spill, the Applicant could dispatch its personnel to the scene to assist local law enforcement and fire department personnel to contain and stabilize the spill. Depending on the nature and magnitude of a spill, personnel from an appropriately licensed cleanup firm may be required for spill mitigation.

5.7.1.6 <u>Security and Safety</u>

<u>Security</u>

1. Security and safety measures would be employed to minimize the risk of accident or injury to unauthorized or untrained persons. These measures would include:

   - Fencing at facilities where activities could endanger employee or public safety, including the mine pits, heap leach pads, solutions ponds, and gold recovery plant.
   - Earthen berms at locations to restrict access to mine pits and haul roads by unauthorized vehicles.
   - Personnel trained in security would be onsite 24 hours each day.

<u>Safety</u>

1. Employee training procedures would be implemented in accordance with Mine Safety and Health Administration regulations to ensure all employees are familiar with potential hazards of their jobs, and in the proper handling of chemicals. First aid equipment would be provided at appropriate locations.

5.7.1.7 Traffic

1. The project would generate limited but regular traffic along the two access routes. Existing conditions on the unmaintained or irregularly maintained portions of dirt roads are variable and maybe inappropriate for regular use.

2. The Applicant would provide improvements including road grading, widening, and signage along portions of these roads as indicated in the description of the proposed action (see Figure 3.2.10, Proposed Access Routes and Improvements, and Table 3.2.4, Proposed Access Improvements). In addition, the Applicant would be responsible for regular maintenance of these road segments during the project life, including grading, graveling, and dust suppression.

3. The proposed project would increase traffic on both the Searchlight Access Route and Ivanpah Access Route. The potential for accidents on these graded dirt access roads could occur if safe driving speeds are not observed. A maximum speed limit of 35 miles per hour would be posted on these roads. Employees would be instructed for proper vehicle handling and safe speeds.

5.7.1.8 Reclamation

1. Reclamation would occur for decommissioned facilities during the operational period, and for remaining facilities following project completion. Safety measures such as restricting access to mine pits, heap leach pad neutralizing and decommissioning, storage pond neutralizing, and liner burial would be accomplished.

5.7.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. Implementation of the Ivanpah Access Route Alternative would not create the potential for additional health and safety impacts. Project traffic increases and associated potential safety impacts would occur primarily on Ivanpah Road.

5.7.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to public health and safety would occur.

5.8 VISUAL RESOURCES

1. This section evaluates the changes that would occur to the scenic quality of Lanfair Valley as a result of the Castle Mountain Project. The BLM manages scenic quality in the East Mojave National Scenic Area (EMNSA) "by attempting to limit the degree of change in the characteristic landscape to standards based upon scenic quality and sensitivity of an area" (BLM, 1988). Impacts to visual quality would be considered significant for discretionary actions in the EMNSA if they would not meet Visual Resource Management (VRM) Class II guidelines.

2. For non-discretionary actions such as the Castle Mountain Project (see Section 2.4.5, Land Use), EMNSA Plan guidelines call for designs that are as visually unobtrusive as "best practices" allow. For the project to be in compliance with the EMNSA Plan, it must be demonstrated that "best practices" would be employed to reduce potential visual impacts. Visual impacts for this operation would be significant if, after reclamation, the changes would exceed VRM Class III, which is the existing rating for the site as established by the CDCA Plan (BLM 1981a).

5.8.1 PROPOSED ACTION

1. The Castle Mountain Project would affect the visual character of the site by changing its nature from passive to active during the operational period, and by long-term changes to the site's topography, surface material and vegetation cover. The potential effects of activities on the visual environment are evaluated in the following paragraphs.

2. As described in Section 4.8, views of the project site are confined to locations within Lanfair Valley. In order to assess the project's potential impact, the proposed action is evaluated in this section relative to the site's visibility from surrounding locations in the Valley. Methods to be employed by the project to reduce visual impacts are also evaluated.

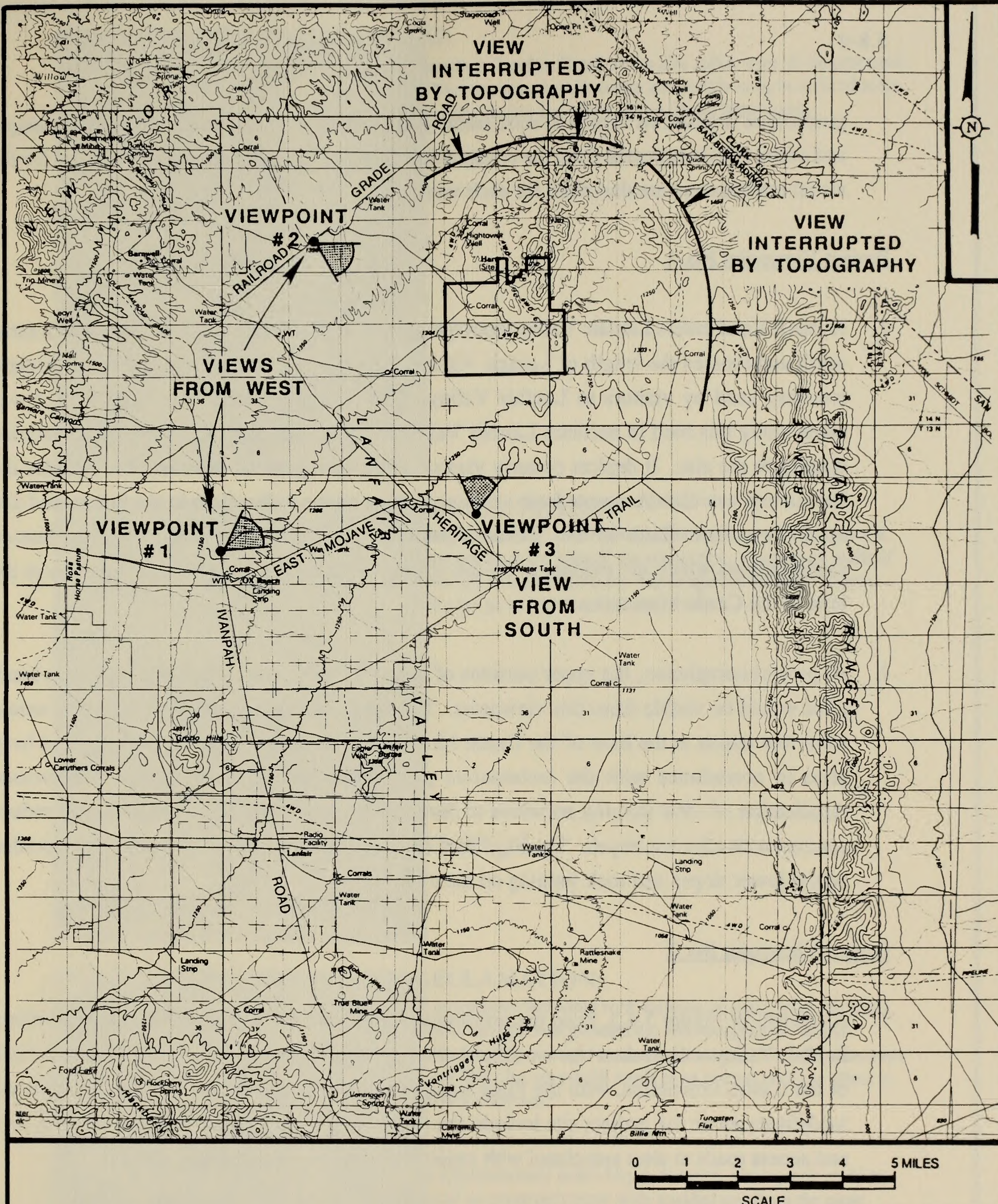
3. Portions of each of the major project components would generally be visible to the public from areas northwest, west, and south of the project site. The degree to which each component would be visible would be related to the ultimate project configuration and the specific location of the observer in relation to intervening vegetation and topography. The scale of the mine pits, overburden, and heap leach piles would greatly alter the visual environment when viewed from onsite locations. However, from offsite locations such as on surrounding roadways in

Lanfair Valley, the visual scale of project modifications would be attenuated by distance. Also, some potential project visual impacts would be moderated by the location of project facilities and by design factors such as contour grading, or reclamation activities such as rock staining and revegetation. The orebodies are beneath a north-south trending drainage (see Figure 3.2.5, Preliminary Site Plan). This location would conceal most of the vertical extent of the pit walls behind a ridge, when viewed from the floor of Lanfair Valley from directions to the north and west. The overburden pile has been planned on an outwash slope bounded on the east and west flanks by small hills. These hills would partially conceal the overburden and provide a natural skyline. The heap leach piles have been planned on lower slopes near the valley floor, southwest of the open pits. This area slopes gently to the southeast. Because the heap leach piles would appear as flat mesas, they would mimic the natural topography of the valley floor, thereby minimizing potential contrast in form.

5.8.1.1 Photograph Simulations

1. To assess the potential visual impact of the Castle Mountain project at completion, visual simulations have been completed. Photographs of the project site were taken from roadways as shown in Figure 5.8.1, Visual Analysis Viewpoints. Scaled photo-simulations were then made based upon the planned locations and elevations of the proposed project facilities as they would be seen from each viewpoint. The viewpoints were chosen to represent the approximate nearest locations on surrounding roads where the majority of passers-by would view the project. Viewpoints were specifically selected where intervening topography and vegetation did not impede site views, to present a "worst case" analysis.

2. The project site photographs and photo-simulations are presented in Figures 5.8.2, Viewpoint No. 1 (Lanfair Road), 5.8.3, Viewpoint No. 2 (Railroad Grade Road), and 5.8.4, Viewpoint No. 3 (East Mojave Heritage Trail). Each figure shows three views: (1) the existing view, (2) the expected view at completion of the Castle Mountain project but prior to reclamation, and (3) the expected view following reclamation activities. It should be noted that reclamation procedures would be accomplished in conjunction with project operation so that the "worst case" view (without reclamation) would never actually exist. Photographs are scaled to depict what the viewer would see with the unaided eye from the same viewpoint. The color of earth materials (before reclamation) was derived from samples obtained from the drilling program that delineated the ore deposits. The degree of visual contrast reduction by reclamation



LEGEND

● APPROXIMATE VIEWPOINT LOCATION

DIRECTION OF VIEW

CONTOUR INTERVAL: 50 METERS

BASE MAP: U.S.G.S. 1:100,000 SERIES TOPOGRAPHIC MAPS OF DAVIS DAM AND IVANPAH

FIGURE 5.8.1

VISUAL ANALYSIS VIEWPOINTS

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procedures is based on results of rock staining at other sites, anticipated final grading design, and initial results expected from the revegetation program. Specific changes anticipated for the visual environment are described for each viewpoint.

Project Viewpoint No. 1

1. Ivanpah Road enters Lanfair Valley from the northwest via Barnwell. This road, which turns south and crosses the length of Lanfair Valley, is known as Lanfair Road and is the primary roadway used by visitors to Lanfair Valley. The photograph shown in Figure 5.8.2 was taken along this road in northern Lanfair Valley at its junction with an unimproved dirt road leading to the site. It depicts easterly views. The existing visual environment includes the Joshua tree woodland/creosote bush scrub vegetation on the valley floor in the foreground and on the southern flank of the Castle Mountains in the background. Existing human modifications which are evident in the photograph include the dirt road and clay pits at the base of the Castle Mountains.

2. At project completion, the upper portions of open pit walls, overburden pile, and heap leach piles would be visible from this viewpoint. The heap leach piles and overburden pile would form low mesas at the base of the Castle Mountains. Revegetation of overburden and heap piles in accordance with the reclamation plan would reduce the initial color contrasts. Application of rock staining solutions to darken the upper walls of mine pits would reduce contrast with adjacent slopes. The Big Chief Hill clay pit would be reclaimed with overburden on the lower slopes and rock staining on the upper pit wall.

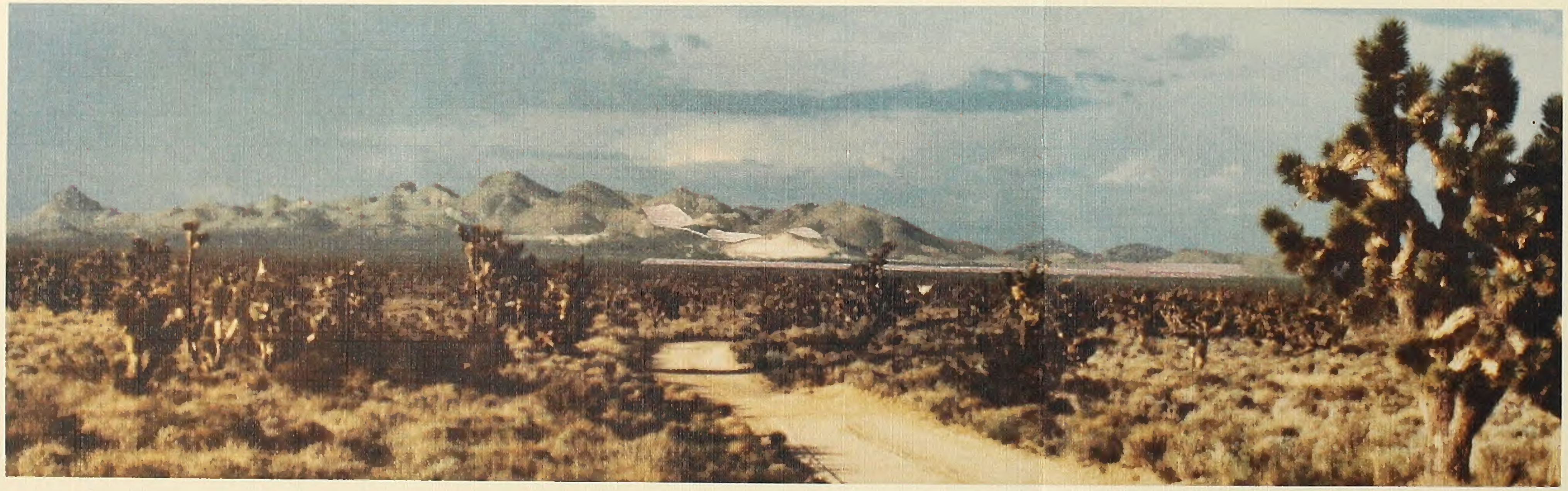
Project Viewpoint No. 2

1. As shown in Figure 5.8.3, from the northwest, foreground views are dominated by northern Lanfair Valley with Joshua tree woodland. Background views include the southwestern flank of the Castle Mountains, with the Piute Range forming the distant skyline. Visible existing modifications on the project site include the clay pits, particularly the one at Big Chief Hill, and access roads to sites associated with exploration and previous mining activities.

2. Elements of the completed project visible from this location would include the upper limits of the Lesley Ann and Oro Belle pit walls and the heap leach piles. The pit walls would initially appear as lighter colored rock which would contrast with the darker slopes of the Castle Mountains. Heap leach piles would appear as low mesas similar to the distant outline of the

EXISTING:

View northeast from Lanfair Road, about five miles west of the proposed project site. The existing clay pit mines are visible as light-colored areas (center) against the darker backdrop of the Castle Mountains.



BEFORE RECLAMATION:

At project completion, heap leach piles (center) and overburden pile (at right) form low mesas at the base of the mountains. Portions of walls of the Lesley Ann and Oro Belle pits are visible against mountain slopes. Big Chief Hill clay pit is still the dominant feature.

AFTER RECLAMATION:

Reclamation procedures including rock staining of upper mine pit walls, grading to reduce straight line geometrics, and revegetation would effectively mitigate the potential for strong visual contrasts. Reclamation of the Big Chief Hill clay pit would result in an overall positive effect to the existing visual contrasts.

Note:
When held at approximately arm's length distance, photograph scale is representative of an observer's view with unaided eye from the same viewpoint.

FIGURE 5.8.2

VIEWPOINT NO. 1
(LANFAIR ROAD)

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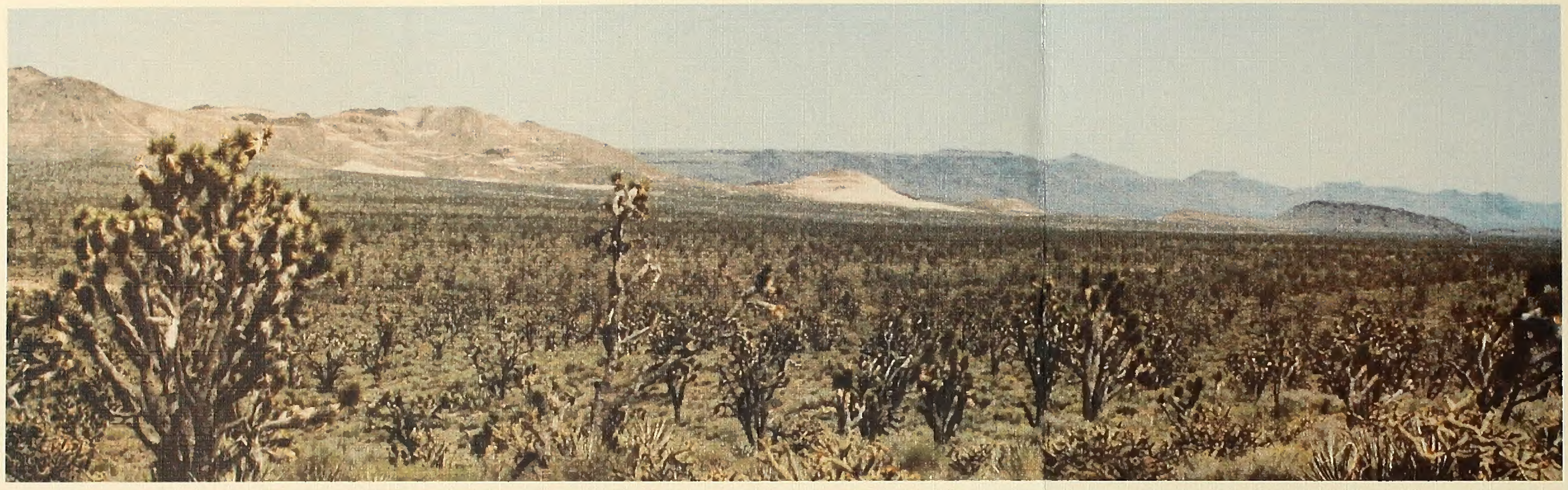
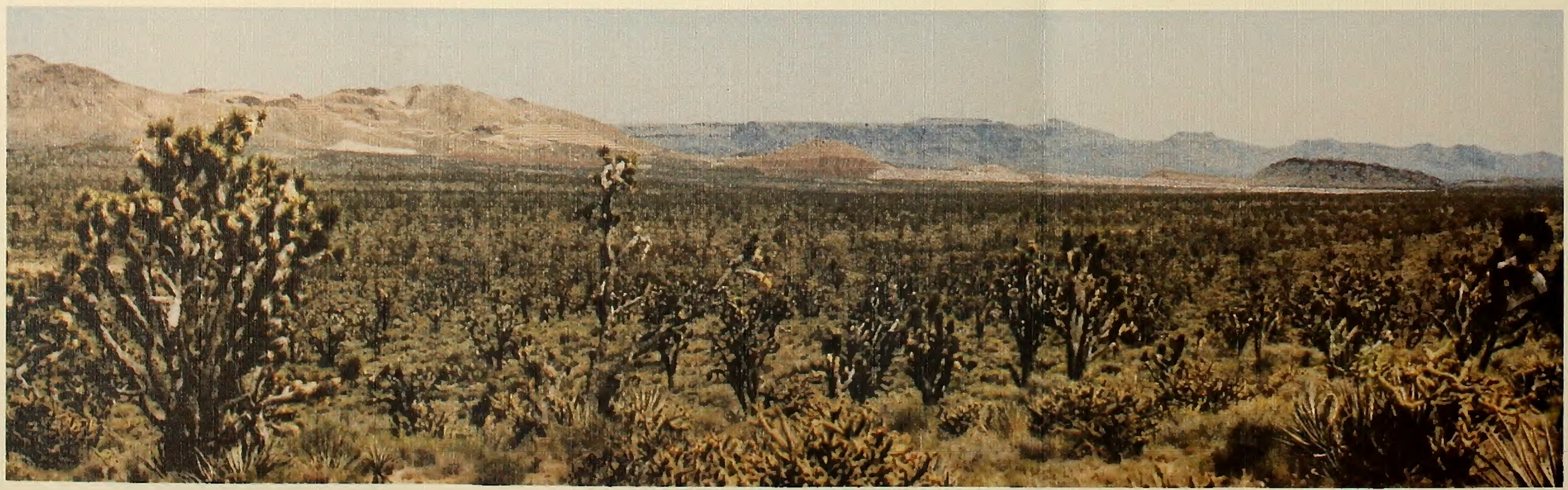


EXISTING:

View southeast from Railroad Grade Road (adjacent to Wilderness Study Area 266) less than two miles from project site. Castle Mountains appear at left with Piute Mountains in background. Big Chief Hill clay pit mine is located at center. North clay pit mine is at left with former mining and exploration roads above.

BEFORE RECLAMATION:

Heap leach piles are shown on lower slopes at right. Portions of walls of Lesley Ann and Oro Belle pits can be seen against slopes at left. Overburden stockpile can not be seen due to intervening topography.



AFTER RECLAMATION:

Reclamation procedures including rock staining of upper mine pit walls, grading to reduce straight line geometrics, and revegetation would effectively mitigate the potential for strong visual contrasts. Reclamation of the Big Chief Hill clay pit would result in an overall positive effect to the existing visual contrasts.

Note:
When held at approximately arm's length distance, photograph scale is representative of an observer's view with unaided eye from the same viewpoint.

FIGURE 5.8.3

VIEWPOINT NO. 2
(RAILROAD GRADE ROAD)

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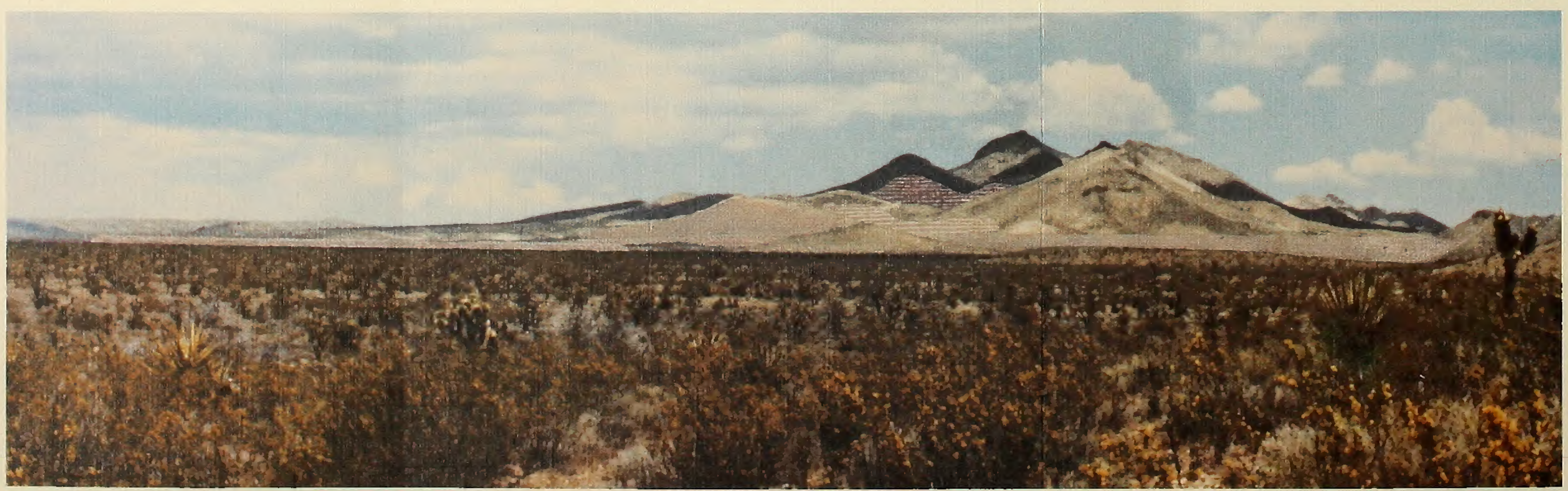
EXISTING:

View north from East Mojave Heritage Trail (about three miles from project site) towards southern limits of Castle Mountains. Existing clay pit mine at Big Chief Hill is at center. Clouds shadow upper slopes and canyons.

BEFORE RECLAMATION:

Overburden stockpile forms mesa between lower hills at right. Heap leach piles form the light-colored line below horizon at left. Portions of Lesley Ann and Oro Belle pit walls are seen against slopes at center (Oro Belle shown without cloud shadowing).



AFTER RECLAMATION:

Reclamation procedures including rock staining of upper mine pit walls, grading to reduce straight line geometrics, and revegetation would effectively mitigate the potential for strong visual contrasts. Reclamation of the Big Chief Hill clay pit would result in an overall positive effect to the existing visual contrasts.

Note:
When held at approximately arm's length distance, photograph scale is representative of an observer's view with unaided eye from the same viewpoint.

FIGURE 5.8.4

VIEWPOINT NO. 3 (EAST MOJAVE HERITAGE TRAIL)

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Piute Range (see Figure 5.8.3). Initial color contrasts would be reduced with revegetation of overburden and heap piles, and application of rock staining solutions to upper pit walls. The Big Chief Hill clay pit would be reclaimed with overburden on the lower slopes and rock staining on the upper pit wall.

Project Viewpoint No. 3

1. Views from the south (see Figure 5.8.4) in the vicinity of the East Mojave Heritage Trail encompass creosote bush scrub community on the valley floor and along the southern limits of the Castle Mountains. The existing Big Chief Hill clay pit is the most prominent disturbance visible.

2. As shown in Figure 5.8.4, the overburden pile and the south-facing slopes of the open pits would be visible from this southerly direction. The overburden pile would form a mesa on an outwash plain bounded by small hills. The heap leach piles would form low mesas below the similarly configured horizon. Portions of the Lesley Ann and Oro Belle upper pit walls would be visible against the slopes of the Castle Mountains. Initial color contrasts would be reduced with revegetation of overburden and heap piles, and application of rock staining solutions to upper pit walls. The Big Chief Hill clay pit would be reclaimed with overburden on the lower slopes and rock staining on the upper pit wall.

5.8.1.2 Visual Impact Analysis

1. The VRM program employes a contrast rating system to measure the degree of contrast between a proposed action and the existing landscape. The score for a proposed action is compared with allowable levels of contrast for the appropriate management class. For the analysis, the landscape is divided into features and elements. Features include: land or water surface, vegetation, and structure (man-made structures). Elements include: form, line, color, and texture. Each element is assigned a value based upon its significance in the setting. (Form = 4, the most important; texture = 1, the least important). The proposed activity is then compared to the existing setting by element and feature according to the degree of contrast (3 = strong, 2 = moderate, 1 = weak, 0 = none). Application of the VRM contrast rating system for the Castle Mountain Project during operation (with facilities completed) and following reclamation is shown in Table 5.8.1, Visual Resource Management Project Contrast Rating. These ratings were used to determine what aspects of the project would be most

TABLE 5.8.1

VISUAL RESOURCE MANAGEMENT PROJECT CONTRAST RATING

Method: ELEMENT (Weight) x DEGREE OF CONTRAST (rating) = SCORE

FEATURE			BEFORE RECLAMATION[1]			AFTER RECLAMATION[2]		
	Element		Contrast		Score[3]	Contrast		Score[3]
LAND SURFACE	Form	(4)	Moderate	(2)	8	Weak	(1)	4
	Line	(3)	Moderate	(2)	6	Weak	(1)	3
	Color	(2)	Moderate	(2)	4	Weak	(1)	2
	Texture	(1)	Weak	(1)	1	Weak	(1)	1
				TOTAL	19		TOTAL	10
VEGETATION	Form	(4)	Weak	(1)	4	Weak	(0)	0
	Line	(3)	Weak	(1)	3	Weak	(1)	3
	Color	(2)	Strong	(3)	6	Moderate	(2)	4
	Texture	(1)	Weak	(1)	1	Weak	(1)	1
				TOTAL	14		TOTAL	8
STRUCTURE	Form	(4)	Weak	(1)	4	None	(0)	0
	Line	(3)	Moderate	(2)	6	None	(0)	0
	Color	(2)	Weak	(1)	2	None	(0)	0
	Texture	(1)	None	(0)	0	None	(0)	0
				TOTAL	12		TOTAL	0

Explanation:

This table evaluates the potential visual contrasts of the Castle Mountain Project according to VRM procedures. The VRM process first segregates the landscape into its major **features** (land surface, vegetation, structures) and each feature, in turn, into its basic **elements** (form, line, color, texture). Each element is assigned a weighted value, based on its significance in the landscape. The Contrast Rating reveals the existing features and their respective elements that would be subject to the greatest visual impact. A total contrast score for each feature may then be used to define the overall contrast for each feature.

If the Castle Mountain Project were completed before reclamation efforts were initiated, the Contrast Rating scores for land surface, vegetation, and structure would be 19, 14, and 12, respectively (with structures onsite). This level of contrast would be defined as moderate. After reclamation efforts are completed, land surface, vegetation, and structure scores would be reduced to 10, 8, and 0, respectively. This level of contrast would be defined as weak.

(1) Contrast rating evaluation based upon visual simulations (see Figures 5.8.2, 5.8.3, and 5.8.4) for impact during project operation. Existing contrast of Big Chief Hill clay pit is not evaluated.

(2) Contrast rating evaluation based upon completion of reclamation activities (shown in Figures 5.8.2, 5.8.3, and 5.8.4) including contouring of heap piles and overburden, rock staining of upper pit walls, and revegetation on heap piles, overburden and roads.

(3) VRM Contrast Rating Scores:

- 0 to 10 points - Contrast can be seen but does not attract attention (i.e., weak).
- 11 to 20 points - Attracts attention and begins to dominate (i.e., moderate).
- 21 to 30 points - Demands attention and will not be overlooked by the average observer (i.e., strong).

Source: U.S. Bureau of Land Management, 1981, Visual Resource Management Program.

noticeable, and what reclamation measures would be most effective. Operational activities, surface disturbance, and land form modifications considered in this rating application are described in the following paragraphs.

Operational Activities and Equipment

1. During the anticipated 10-year operational life of the proposed project, facilities and equipment such as buildings, fuel and water storage tanks, utility lines, and mobile equipment would be visible on the project site. Most equipment and structures would be clustered in three locations on the site; in the vicinity of the processing plant facility, the crushing facility, and the mine shop/truck ready line (see Figure 3.2.5, Preliminary Site Plan). Buildings would include a mine maintenance building, a gold processing building, and an administration building. Structures containing equipment to crush ore and conveyors to transport ore to the heap leach piles, silos for reagent storage, and fuel tanks would also be visible. Water tanks would be constructed, and a microwave dish would be used for communication. The anticipated locations of these facilities are shown in Figure 3.2.9, Preliminary Utilities Plan. The color of buildings and structures would be chosen so as to blend in with the surrounding landscape when viewed from a distance.

2. The operating facilities would be visible from certain Lanfair Valley locations during the life of the mine. The crushing and processing plant facilities would be located west of the overburden pile and adjacent to the southwestern heap leach pile, respectively, and would therefore be visible from the northwest, west, and south. The truck ready line and mine shop would be located at the overburden pile, with visibility primarily from the south. Electrical transmission lines would be strung on wooden poles approximately 30 feet high, from the site generators to the crushing plant and mine shop, the leach pads, the ponds, and the West Well Field. These poles would be evident in close views, but would generally blend with the vegetative background when viewed from a distance such as from Ivanpah Road. Outdoor lighting for mine pits and other areas of nighttime activities would create new artificial illumination, although these lights would be shielded to reduce fugitive offsite illumination.

3. The operating facilities would be limited in size, location, and number. It is expected that their presence would not substantially change the visual character of the site. Reclamation procedures require that the facilities would be removed at project completion. Consequently, visual changes related to these facilities would be limited to the project operational period.

4. During the operational phase, movements of vehicles and heavy equipment would change the nature of the site from passive to active. Such movements would tend to draw the eye of an observer in Lanfair Valley. Fugitive dust emissions from ore processing operations are limited by air quality regulations (see Section 5.6, Air Quality) and the project would employ measures to reduce the impact to an insignificant level.

5. Graded gravel roads would connect the various onsite facilities. Haul roads from the mine pits to the crusher and to the mine shop would be about 60 feet wide to enable heavy equipment to pass safely. Service roads would in general be 25 feet wide and would provide access from Hart Mine Road to the crushing and processing facilities, heap leach piles, and the administration building. Service roads providing access from Hart Mine Road to individual wells in the West Well Field would be 12 feet or less in width. Many of the roads would be on gentle slopes at lower elevations and due to intervening vegetation, generally would not be visible from locations in Lanfair Valley other than the project site. Roads constructed for the project and not designated by BLM for subsequent land management purposes would be reclaimed following project completion.

Surface Disturbance and Landform Modification

1. The primary visual impact of the completed project would be changes in color contrasts, and land form and line resulting from removal and redistribution of earth materials and removal of vegetation. The effects of these changes would be long term and would alter the visual character of the site. Open pits would be created from ore and overburden removal, and mesas would be formed as the overburden pile and heap leach piles are constructed. The lighter earth colors of disturbed areas would initially be noticeable as would the form and scale of the mine pits, overburden and heap leach piles. Natural revegetation on the overburden pile and heap leach piles to pre-disturbance cover would likely require decades, and natural revegetation on the mine pit walls would require an even longer period

2. The topography of the site and surrounding area would, to a moderate extent, attenuate the visibility of some project features. Distance would also attenuate the degree of visual impact to Lanfair Valley since the most sensitive viewpoints (in WSA 266) are over three miles distant from the site. The primary roadways in the Valley are also generally over three miles distant.

Searchlight Access Route Improvement

1. The proposed Searchlight Access Route improvements would change the appearance of the unimproved portion of the road, and some areas of undisturbed land. An approximately 16-foot wide graded road similar to the existing Hart Mine Road would be constructed from Clark County Road A68P to the site. The road grade would follow the existing terrain wherever possible, thereby minimizing cuts and fills. The primary visual impact would be the removal of vegetation over about 3.3 miles of new road construction. Clark County Road A68P would not be widened, but the Applicant has proposed construction of turnouts approximately every half mile. This improvement would not significantly alter the visual character of this road.

Reclamation

1. A Reclamation Plan has been developed in accordance with Federal (43 CFR 3809) regulations and California Surface Mining and Reclamation Act (SMARA) requirements. This plan includes measures that would reduce the potential visual contrast to land surface and vegetation including:

   - Contouring of the overburden and heap leach piles would be accomplished to reduce potential contrast in form and line. Pit wall surfaces would be treated to be as visually unobtrusive as best practices allow.
   - A revegetation program would be implemented with emphasis on use of plant species common to the area. Revegetation would reduce the color contrast of the overburden pile and heap leach pile. The program would be developed and implemented using the results of a revegetation research program designed for successful revegetation in the desert environment.
   - Rock staining solutions would be applied to rock wall surfaces in the upper portions of the mine pits. These solutions are designed to be permanent and would be colored to reduce the contrast between the pit walls and the surrounding undisturbed slopes. These solutions have been developed specifically to reduce visual contrasts by darkening rock surfaces exposed by activities such as road cuts.

   These procedures would be applied to onsite and offsite areas disturbed by the Castle Mountain Project. The Applicant has also obtained rights to the Big Chief Hill clay pit and

would reclaim this existing feature as part of the reclamation program. In addition, at the discretion of BLM, other onsite areas disturbed prior to Federal Land Policy Management Act and SMARA requirements would be candidates for reclamation.

2. The most evident project change as viewed from three or more miles distant may initially be the contrast in color. To reduce this contrast, the upper pit walls would be sprayed with rock staining solutions specifically designed for the project. At project completion, the visual appearance of those areas as viewed from offsite locations would be similar to the adjacent rocky and sparsely vegetated slopes. The color contrasts for other areas disturbed by the project would be less than the contrasts presented by the existing clay pits. Fine-textured and highly reflective clay minerals are responsible for the large contrasts between the clay pits and the surrounding terrain. Clay minerals are present in the soils and rock to be disturbed by the proposed project, but in much lower concentrations than in the active clay quarries. The color contrasts shown for the overburden and heap piles would be attenuated as vegetation over these areas becomes established.

3. Based upon the reclamation procedures in the photo simulations, distant views of the natural environment from surrounding roadways would not be significantly affected because the scale of project elements would be subordinate to the natural landscape. The visual impression would be dominated by the natural terrain and vegetation, while evidence of human activity would be secondary. The appearance of the overburden and heap leach piles when viewed from the northwest, west, and south would be low mesas generally compatible with the surrounding natural topography. The form of these elements would not interrupt the dominant background ridgelines of the Castle Mountains and Piute Range.

5.8.1.3 Conclusion

1. Based upon this visual analysis, the proposed Castle Mountain Project would meet the guidelines for VRM Class III; after reclamation, visual changes would remain "subordinate to the existing characteristic landscape." The proposed design of the project, including reclamation during and after the operational period of the mine also satisfies the EMNSA Plan's guidelines which call for application of "best practices" to minimize visual change.

5.8.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. Implementation of this alternative would not significantly alter the visual effects as described for the proposed action. Changes to color, land surface, and vegetation would be the same for the project site. Visual effects along the Searchlight Access Route would be limited to some vegetation removal for construction of the natural gas pipeline. This action would not appreciably change the project's potential visual impacts.

5.8.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to visual resources would occur.

2. Areas within the project boundary which were disturbed by third parties prior to the time reclamation was required under the FLPMA and the SMARA would not be reclaimed.

5.9 <u>CULTURAL RESOURCES</u>

5.9.1 PROPOSED ACTION

1. The proposed action has been designed to avoid known historic and prehistoric cultural resources to the extent possible. Prior to design and siting of the Castle Mountain Project, a cultural resources literature search and surface inventory were undertaken covering areas which were anticipated to be within the site boundaries, as discussed in Section 4.9. The proposed arrangement of project facilities reflects revisions based in part on archaeological sensitivities that have been incorporated into the project's engineering design.

2. The completed surface inventory will be used to evaluate sites for eligibility. Potentially eligible sites will be further explored through a subsurface testing program. Results of the inventory and subsurface testing program will be incorporated into a technical report, which will form the basis for a BLM recommendation of each site's eligibility for inclusion in the National Register of Historic Places (NRHP).

3. The criteria established to evaluate a site's potential for inclusion in the NRHP is set forth in 36 CFR 60.4 as follows:

   - "The quality of significance in American history, architecture, archaeology, and culture, is present in districts, sites, buildings, structures, and objects that posses integrity of location, design, setting, materials, workmanship, feeling, and association, and:

     - (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
     - (b) that are associated with the lives of persons significant in our past; or
     - (c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that posses high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
     - (d) that have yielded, or may be likely to yield, information important in prehistory or history."

   Upon application of the criteria of eligibility, the criteria of effect and adverse effect are applied to sites recommended for inclusion in the NRHP. Determinations of eligibility, effect, and treatment are reached through consultation between BLM and the State Historic Preservation

Officer (SHPO). Formal compliance with Section 106 is issued by the Advisory Council on Historic Preservation following its review. In accordance with National Environmental Policy Act implementing regulations (40 CFR 1502.25), the process of taking into account the potential effects of the proposed project upon cultural properties (36 CFR 800) is pursued concurrently with preparation of the EIS.

4. Concurrence by BLM and the SHPO has been reached through initial consultation regarding most of the identified sites. Of those sites inventoried, 22 have been determined as outside the area of potential effect, and another 21 have been determined as ineligible. Seven aboriginal sites have been determined as eligible for NRHP inclusion, subject to adverse effect. The treatment of five of these seven aboriginal sites, which meet criterion d, will be formulated such as to afford determinations of no adverse effect (36 CFR 800.9[c][1]) by means of data recovery. The remaining two aboriginal sites require further evaluation, which is in progress. Four historic sites also require further evaluation.

5.9.1.1 Searchlight Access Route

Prehistoric Period

1. The proposed access between Searchlight and the project operations area could adversely affect two prehistoric sites. One site (26-Ck-3849) is a quarry that is significant for understanding patterns of regional acquisition and distribution of tool stone by Mojave Desert native inhabitants and in understanding late prehistoric lithic technology. Rerouting the proposed roadway has reduced potential impacts to this site, but the required widening of the roadway would eliminate an approximate 12-foot strip of the site for about 3,000 feet.

2. The proposed access road could increase general public accessibility along the alignment. This could result in indirect impacts to a significant aboriginal camp (CA-SBr-6054/6055). This site is a rock shelter that appears to have been a storage site for perishable goods, as well as a refuge during inclement weather.

Historic Period

1. The NRHP eligibility of the historic railroad grade (CA-SBr-3047H/26-Ck-3873) is under Section 106 review.

2. An extensive trash scatter (26-Ck-3878) along the historic railroad grade is associated with aspects of the construction or use of the railroad. Although the site is considered eligible for NRHP nomination, it would be avoided by the access road and consequently would not be affected by the proposed project.

5.9.1.2 Project Operations Area

Prehistoric Period

1. Prehistoric sites would be adversely impacted by proposed mining and processing operations. Adverse effects would occur to sites that could be modified or destroyed by open pit mining, overburden stockpiling, or the construction of haul roads, process and recovery facilities, and other ancillary facilities. The following summarizes the potential project-related impacts to prehistoric sites by type of resource:

   - Quarries: The proposed project would adversely affect three aboriginal quarry sites (CA-SBr-5705, -5706, -5707). In general, these sites display intensive workings that provide substantial information on aboriginal tool stone quarrying and reduction activities.
   - Materials Prospects: Two material prospects (CA-SBr-5872, -5708) are recommended for detailed recordation and ineligibility in accordance with a programmatic memorandum between BLM, SHPO, and ACHP, by application of "Sparse Lithic Scatters" recording criteria.

Historic Period

1. Three historic sites, including the Valley View Mine and Mill site (CA-SBr-5710H), Hart townsite (CA-SBr-3060H), and former town well (CA-SBr-3040H), are situated within the area of potential effect. The NRHP eligibility of the three sites is under Section 106 review.

5.9.1.3 West Well Field

Prehistoric Period

1. No prehistoric sites would be impacted by construction of the West Well Field since no cultural sites have been found in this area.

Historic Period

1. No historic sites are located within the proposed West Well Field.

5.9.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include development of the proposed action, but improvements along the Searchlight Access Route would be limited to construction of a natural gas pipeline. If this alternative were implemented, potential impact to prehistoric or historic cultural resources along that roadway alignment would not be expected.

5.9.2.1 Prehistoric Period

1. With the Ivanpah Access Route Alternative, a new access road would not be provided. Some road widening of the existing access is anticipated. High cultural resource sensitivity within the Ivanpah Access Route area of potential effect is not foreseen. Upon determination of the precise alignment and width of access proposed, the area would be subject to Section 106 evaluation. No surface-disturbing activities would occur along the Ivanpah Access Route until the provisions of Section 106 had been complied with.

2. In the vicinity of the proposed operations area, this alternative would have the same direct and indirect impacts to prehistoric resources as would the proposed action.

5.9.2.2 Historic Period

1. Use of the Ivanpah Access Route Alternative would avoid directly impacting those sections of the roadbed of the former Barnwell and Searchlight Railroad, located in Nevada. The trash scatter located along the proposed Searchlight Access Route, which would be avoided with implementation of the proposed project, would remain unaffected with implementation of the Ivanpah Access Route Alternative.

2. In the vicinity of the proposed operations area, this alternative would have the same direct and indirect impacts on historic resources as would the proposed action.

5.9.2.3 Native Americans

1. Areas which could be important to local Native American groups were identified during preparation of the California Desert Conservation Area Plan. Review of this inventory data revealed no sensitive sites within the area of potential effect (see Section 4.9.2.3) of the Castle Mountain Project.

5.9.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to cultural resources would occur.

2. Sites for which data recovery has been recommended would not be investigated. Efforts to analyze the data to gain a more comprehensive understanding of the types of prehistoric activities and aboriginal cultural adaptations in the arid eastern Mojave Desert region would not be pursued.

5.10 LAND USE

1. Criteria for evaluating potential land use impacts are based on compatibility of proposed activities with surrounding land uses and on conformance with applicable ordinances and permit requirements. Impacts would be considered significant if:

   - Proposed land uses result in a situation where adjacent or nearby properties may no longer be used for existing activities or developed for permitted uses.
   - Proposed uses and activities would be in conflict with applicable ordinances and/or permit requirements.
   - Proposed actions would not be in conformance with approved land use plan(s).

5.10.1 PROPOSED ACTION

5.10.1.1 Consistency With Plans, Policies, and Regulations

Bureau of Land Management

1. Mining operations are consistent with BLM multiple-use objectives outlined in both the California Desert Conservation Area (CDCA) Plan and the East Mojave National Scenic Area (EMNSA) Plan. In order to achieve the balance between resource use and resource preservation sought in both plans, the proposed Castle Mountain Project would be required to implement measures to prevent unnecessary or undue degradation and provide protection to nonmineral resources. The proposed project site is designated in the CDCA Plan for Multiple-Use Class L. As required for this class, mining operations must comply with the requirements of the 43 CFR 3809 regulations, the principal instrument of the Federal government to review, condition, and monitor mining operations. These requirements include:

   - Submittal of a Plan of Operations.
   - Complying with applicable Federal and State air quality standards, including the Clean Air Act.
   - Complying with applicable Federal and State water quality standards.
   - Complying with applicable Federal and State standards for the disposal and treatment of solid wastes, including the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act.
   - Taking such action as may be needed to prevent adverse impacts to threatened or endangered species and their habitat.

- Complying with applicable Federal and State regulations for cultural resource protection, including Section 106 of the National Historic Preservation Act.
- Furnishing a financial guarantee for reclamation, if required by authorized officer.

2. The Castle Mountain Project would be in conformance with the CDCA Plan and EMNSA Plan policies and regulations for special areas and wilderness. The Castle Mountain Project would not infringe on either the New York Mountains or Piute Creek Areas of Critical Environmental Concern (ACEC). The project would not encroach into, and thereby impair, the wilderness value of the six wilderness study areas (WSAs) around Lanfair Valley, including the suitably recommended Castle Peaks and Fort Piute WSAs.

3. The Castle Mountain Project would be in conformance with recreation management policies and the management program of the EMNSA Plan. The proposed action would include a viewpoint and interpretation/information area onsite to inform visitors of current operations as well as the mining history of the area.

4. The Lanfair Valley desert grassland UPA would be impacted by portions of the project. Reclamation would include measures to reestablish this vegetation, pursuant to CDCA Plan management practices. Section 5.4, Vegetation, provides a discussion of reclamation efforts and anticipated impacts.

5. The onsite power generation facilities proposed for the Castle Mountain Project would be in conformance with EMNSA Plan policies for energy production. Generators for mining use are permitted by the EMNSA Plan.

<u>County of San Bernardino</u>

1. The proposed Castle Mountain Project would be consistent with County of San Bernardino General Plan objectives for mineral development in the desert region encompassing the East Mojave Desert. The proposed project would develop gold ore deposits in an area recognized as having high potential for mineral resource development (Mineral Resource Zone 2 overlay designation). County regulations require that mining operations be conducted in a manner that minimizes disturbance of the environment and that mined and disturbed lands are reclaimed. Project consistency with these objectives is determined through the County's discretionary re

view process under regulations such as the California Surface Mining and Reclamation Act of 1975 and the California Environmental Quality Act. This document is an integral part of the review process.

5.10.1.2 Compatibility with Existing Land Uses

Mining

1. Mining in the Castle Mountains would be consistent with past and present mining activities at the project site. The proposed project would alter the character of mining activity on the site, replacing facilities associated with abandoned underground gold mining with an open pit heap leach mining operation. Operation of the project would not interfere with the ongoing use of either of the two adjacent clay quarries.

Grazing

1. Rangeland impacts at the project site would be limited, because much of the site would remain accessible for grazing while the project is operating. Project facilities and operations would involve about 35 percent of the project site. The remaining area would remain open and available for livestock grazing. With the exception of the leach pad facilities and soil storage areas, most project facilities would be located on areas where native vegetation has previously been removed or greatly disturbed, or at higher elevations where native vegetation is less productive than on the valley floor. The leach pads, process plant, solution ponds, and soil storage areas, however, would impact approximately 315 acres of more productive desert grassland vegetation on the valley floor.

2. One objective of the site reclamation plan is the reestablishment of existing land use activities. This will include revegetation of disturbed areas for grazing. The productivity of Pasture 2 of the Lanfair Valley grazing allotment, which encompasses the principal site of the proposed mining operations, averages 24 acres per animal unit month (AUM). The amount of rangeland affected at the proposed project site would be about 890 acres, which includes the 315 acres mentioned above. This represents a temporary reduction of rangeland productivity of about 32 AUMs or less than 0.3 percent of the 12,168 AUMs authorized for use in the Lanfair Valley allotment.

3. The reconstruction of a pipeline to an existing abandoned tank and corral in Section 23 would be precluded by implementation of the Castle Mountain Project. At the discretion of BLM, the abandoned tank, troughs, and corral would be removed and disposed of by the Applicant.

4. The Searchlight Access Route would disturb approximately 20 acres (or about 0.8 AUMs) of rangeland within the Crescent Peak and Lanfair Valley allotments. This impact would not have a notable effect on the current carrying capacity of these rangelands. The access road would, however, increase the potential danger to grazing livestock as a consequence of increased traffic, particularly in the Crescent Peak allotment. The primary reason is that cattle cross this road to get from pasture areas to water sources. While project traffic is limited and would not impede cattle movement, the risk of cattle injury or death from project vehicles or other general public vehicles is expected to increase.

5. The Applicant would implement measures to avoid potential conflicts with grazing along this road. Proposed bus transportation for project employees, posting the roadway for a 35 miles per hour speed limit, additional fencing, and placing cattle guards at all crossings of forage pasture fences would reduce the danger to livestock. Cattle fencing would be constructed according to BLM specifications so that wildlife could pass through. Fencing would be removed at completion of operations, except in areas where livestock must be excluded to allow revegetation efforts to take hold. In addition, the Applicant would compensate the grazing lessee if any cattle are killed by project traffic.

6. Traffic control measures along the access road may not completely attenuate the increased danger to livestock resulting from increased use of the road by the general public. These users would be traveling in their own vehicles and may not adhere to posted speed limits.

Recreation

1. Safety considerations would preclude most recreational activity on the site during the operational period. Activities such as hunting, rock collecting, and sightseeing would be temporarily prohibited from many parts of the 2,800-acre operations area. Accessibility to some historical features, such as remnants of former gold mining operations, would be reduced or restricted. Project operations would eliminate most vestiges of the turn-of-the-century mining activities within the project boundaries, including a number of the mine adits and shafts, headworks, and the mill site. These changes could reduce the value of the area to sightseers interested in historical mining activities. The more substantial mining and milling

sites have already been photographed and inventoried for historical purposes. An interpretive/information site and viewpoint for existing and former mining activity would be provided to document historic activities and explain ongoing mining activities.

2. The proposed Searchlight Access Route could increase off-road vehicle activities along County Road A68P. The improved roadway would provide an accessible route for most vehicles along an alignment that in some places is passable only by high-clearance vehicles at present. Increased project-related and general public traffic along this route could increase driving hazards for persons engaged in recreational touring. A primary potential impact of the proposed Searchlight Access Route may be the increase in expected use of this area by the general public. The area between the northern Castle Mountains and eastern New York Mountains is infrequently used at present, presumably due to the generally poor condition of the existing road in the central portion of the Searchlight Access Route. Upgrading of this road as an extension of Clark County Road A68P could enhance accessibility and change the nature of the area from what could be termed "backcountry" to that of more intensive use. The BLM and County staff have generally noted this effect in other areas where road improvements have been completed. This "general use" impact would occur during the anticipated 10-year life of the mine. A decision to either close the road and have the Applicant reclaim it, or leave it open to public use would be made by BLM after completion of operations.

<u>Wilderness</u>

1. The Castle Mountain Project and Searchlight Access Route do not encroach into, and therefore do not impact, the wilderness value of the Castle Peaks WSA (WSA 266). However, elements of the project would be visible from selected locations in this WSA (see Section 4.8, Visual Resources). The proposed project likewise would not encroach into the Fort Piute WSA (WSA 267) or Piute Creek ACEC, but would be visible from selected locations within those areas.

5.10.2 IVANPAH ACCESS ROUTE ALTERNATIVE

5.10.2.1 Consistency with Plans, Policies, and Regulations

1. The Ivanpah Access Route Alternative would use existing State and County maintained roads or roads that have historically been used for access (e.g., the Hart Mine Road) as an alternative to providing the Searchlight Access Route to the project site.

5.10.2.2 Compatibility with Existing Land Uses

1. Mining. Use of the Ivanpah Access Route would not alter the compatibility of the proposed project with ongoing clay mining activities at the site.

2. Grazing. Use of the Ivanpah Access Route would not result in increased traffic danger to livestock in the Crescent Peak grazing allotment along the Searchlight Access Route. It also would avoid potential hazards to livestock, which could result from increased general public traffic along the proposed Searchlight Access Route. However, use of the Ivanpah Access Route would result in increased traffic along that route, thereby affecting cattle in the Lanfair Valley allotment and, to some extent, the Kessler Springs allotment in Ivanpah Valley.

3. Recreation. The Ivanpah Access Route Alternative would minimize project-related and general public increases in traffic volumes and conflicts with other vehicles on the East Mojave Heritage Trail segment of Clark County Road A68P.

4. Wilderness. The southwest boundary of the Castle Peaks WSA is formed by the existing Ivanpah Access Route for a distance of about seven miles. Use of this alternative would result in increased dust, emissions, and noise along this access. However, these sights and sounds would originate from outside the boundaries of the WSA and would not be considered as impacts on the WSA.

5.10.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to existing mining, grazing, recreation, or wilderness land uses would occur.

5.11 SOCIOECONOMICS

1. During the public scoping process, many comments were submitted on the positive employment and economic benefits of the proposed action. No potential adverse socioeconomic effects were identified.

2. The project would be considered to have a significant socioeconomic effect if the employment it created would induce substantial growth or concentration of population. Since the proposed action is located within commuting distance of the relatively large population area of Las Vegas, no significant impact to regional employment, population, or housing is anticipated. However, smaller communities may be affected by project employment opportunities and housing requirements.

3. The proposed action would have need for short-term construction employees and relatively long-term operations employees. Existing conditions for regional employment, population, and housing are described in Section 4.11. The potential impact of project employees on these conditions, such as regional population growth, housing availability, and public services needs, is addressed below.

5.11.1 PROPOSED ACTION

5.11.1.1 Employment

1. The Castle Mountain Project is expected to employ a high proportion of skilled workers during construction, and equipment operators and maintenance personnel during project operations. Because skilled workers comprise a large portion of the labor force in the surrounding areas of Clark and San Bernardino Counties (see Table 4.11.1, Labor Force Occupational Characteristics), no substantial import of labor is expected. The project's labor demand would be satisfied in part by workers from Nevada communities such as Laughlin, Searchlight, and others in the Las Vegas valley, as well as from scattered small towns in California.

2. Project construction is expected to employ an average of 100 workers for a 4- to 6-month period. Peak employment during this period could reach 200 for a short duration. These labor requirements are expected to be filled from the existing construction labor force in the metropolitan Las Vegas area.

3. Mining and operations at the Castle Mountain Project would provide up to 150 full-time positions for the life of the project. It is expected that these positions would be filled by the existing labor market of this region. In Clark County alone, the seasonally unemployed labor force generally numbers more than 25,000 (Nevada ESD, 1985). The experienced mining workers needed may come from the desert region of eastern California because there has been more mining activity in San Bernardino County in recent years than in Clark County.

4. An indirect impact of the proposed project would be to stimulate additional jobs in other sectors. This is because mining is primarily a basic industry (an activity that brings money into the community from outside the region). Therefore, expenditures by project employees for goods and services within the region would be expected to create secondary employment in the retail trade and personal services industries. Based upon an economic multiplier of 2.12 (NBMG, 1988), it is anticipated that the project would create 1.12 indirect jobs for every job provided. This would result in approximately 168 indirect jobs. These are expected to be created in the communities where project workers live and shop, primarily in the Las Vegas valley, although a few indirect jobs may occur in other communities of southern Clark County and eastern San Bernardino County.

5.11.1.2 Population

1. It is anticipated that the majority of project work force needs would be provided by the available existing labor force. Accordingly, the project is not expected to directly attract much additional population into the region. On a worst-case basis, if all project employees (150 people) and their families, and indirect job employees (168 people) and their families, were to move into the area, the potential growth would be less than 800 people [1], less than 0.2 percent of the anticipated growth in Clark County (354,000) between the years 1990 and 2000 (Clark County, 1988). Therefore, the project would not be expected to contribute substantially to increased population in either Clark County, Nevada, or eastern San Bernardino County, California.

2. Some relocation of project employees to communities within the region would be expected. Although a number of factors may influence where project employees and their families would locate, it is anticipated that the majority would choose to live in the southern Las Vegas valley

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[1] Based upon 2.5 persons per household.

and, with the Searchlight Access Route, in communities along U.S. Highway 95. The greater choice of housing, range of services, and other amenities provided by the communities proximal to Las Vegas valley may offset the desirability of a shorter commute from outlying communities along U.S. Highway 95. Project bus/van pool service would be provided along U.S. Highway 95 from the southern Las Vegas valley area. The service would be routed to the project site via the proposed Searchlight Access Route. Employees choosing to live in Searchlight, Laughlin, or other communities of southern Clark County would have access to project bus/van pool service at Searchlight for the remainder of the commute to the site. The construction of the Searchlight Access Route and provision of bus/van service could attract workers to the Searchlight area.

3. The larger communities of the San Bernardino County desert region (such as Barstow and Victorville) are considered to be too distant to attract regular project commuters. However, because of their proximity to the site, some of the smaller desert communities of eastern San Bernardino County may attract some of the project's employees, and thereby experience a limited population increase.

5.11.1.3 Housing

1. There will be no housing facilities located at the project site. Personnel would commute from existing communities in San Bernardino and Clark Counties.

2. As a consequence, most project-related housing demand (for workers who would relocate) is expected to occur in the southern Las Vegas valley area, since project bus/van pool service, availability and variety of housing, education, and other community services are expected to be attracting factors. The lower cost of housing in southern Clark County communities (see Table 4.11.3, Selected Housing Characteristics), and closer proximity to the project site of towns such as Searchlight, could attract a limited number of employees and their families. On the other hand, because mining is a comparatively high-paying industry, project employees should be able to afford a broader range of housing than the average area resident. Mine industry wages in Clark County are, on the average, 80 percent higher than wages in the County's dominant service industry (including hotel, tourism, and recreation).

3. Based upon the limited number of project employees and available future housing supplies, the project would not be expected to significantly impact housing availability in the region,

even if it is assumed that all project employees would migrate into the area. In 1983, 1984, and 1985, more than 10,000 permits per year for new dwelling units were issued in Clark County. The project would incrementally contribute to this cumulative growth.

5.11.1.4 Public Services

1. Activities associated with the Castle Mountain Project may increase the potential need for emergency services, including fire, police, and medical. Because the project is located in a remote area, these services, including fire suppression and emergency medical, would be provided by the Applicant. The project would be equipped with an emergency vehicle and staffed by employees trained in first aid. Fire extinguishers and other fire protection equipment would be provided in accordance with the requirements of San Bernardino County, and two 8,000-gallon water trucks would be available for fire protection. These onsite services would reduce the potential need for emergency responses by public agencies. The nearest offsite services (fire and ambulance) are located in Searchlight, Nevada, approximately 20 miles away, and Mountain Pass, California, 30 miles distant.

2. The general public would be able to summon assistance from County emergency service units using the Applicant's telephone system.

3. Castle Mountain Project employees and their families would use available public facilities and services in the communities in which they chose to live. As discussed previously, the potential contribution to regional growth attributable to the proposed project is not expected to be significant. Therefore, the proposed project is not expected to generate a need for new or expanded public facilities and services, and would have no significant contribution to the cumulative demand for services associated with growth.

5.11.2 IVANPAH ACCESS ROUTE ALTERNATIVE

5.11.2.1 Employment

1. This alternative would include development of the Castle Mountain Project. Improvements along the Searchlight Access Route would be limited to construction of a natural gas pipeline. The potential direct employment impacts for this alternative do not differ from those for the proposed action. Although the expected degree of indirect employment would be the same, it is likely that fewer of these jobs would be generated in southern Clark County communities,

such as Laughlin and Searchlight, because access to these towns from the site would be less convenient with this alternative than with the proposed action. Instead, most of the indirect employment would be expected to occur in the Las Vegas valley.

5.11.2.2 Population

1. The population impacts of this alternative differ from those of the proposed action only with respect to possible location. In the absence of an adequate access road between Searchlight and the project site, project-supplied bus/van pool service would be routed to the site from the Las Vegas area via Interstate 15 (instead of via U.S. Highway 95). Convenient site accessibility from southern Clark County communities such as Searchlight and Laughlin would not be available, since travel time would be increased to over one hour (assuming travel to the site via State Route 164 and Ivanpah Road). Employees residing in these towns would have to drive their own vehicles to the junction of State Route 164 and Ivanpah Road to use the project bus/van pool service. Therefore, it is anticipated that fewer project-related households would locate in these southern Clark County communities. Population growth would be expected to occur primarily in Las Vegas valley and, to a limited degree, in some of the smaller desert communities of eastern San Bernardino County.

5.11.2.3 Housing

1. With the Ivanpah Access Route Alternative, housing demand would be oriented north and west of the site, for the reasons described above. This alternative, therefore, would be expected to result in less potential housing demand in southern Clark County communities (such as Laughlin or Searchlight) and in greater project-related housing demand in the Las Vegas valley and, to a lesser degree, in the desert communities of eastern San Bernardino County.

5.11.2.4 Public Services

1. The potential project need for emergency response services would be identical for this alternative as for the proposed project and would be provided by the Applicant. Since the project would provide its own services, no significant impact on public agencies is expected.

5.11.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to employment, population, housing, or public services would occur.

5.12 INFRASTRUCTURE

1. Public scoping comments for infrastructure were primarily related to the routes for project access and the amount of traffic. The project would be considered to have a significant impact on roadway infrastructure if project traffic caused the design capacity of a roadway to be exceeded. An impact on utilities would be considered significant if the project created a substantial demand for new public utilities.

5.12.1 PROPOSED ACTION

5.12.1.1 Transportation

1. Traffic volumes on the roadways in the vicinity of the Castle Mountain Project site would increase during both the construction and operations phases of the project. As discussed in Section 3.2.6.2, Site Access, project-related traffic is expected to increase volumes on the Ivanpah Access Route by about 32 average daily trips (ADT), and on the Searchlight Access Route by about 76 ADT. These traffic volumes are relatively low, and are not expected to adversely impact levels of service on these rural roadways since current volumes are very low. Traffic volumes on paved roads in the region are substantially below design capacities.

2. During the project construction phase, most project traffic would access the site using the Ivanpah Access Routes. Once construction of the Searchlight Access Route is completed and mining operations are underway, it is expected that project-related traffic would primarily use this route (rather than the Ivanpah Access Route), since it is anticipated that employees would live in the larger communities of southern Clark County east of the site. The mine operator would provide bus service for employees between the project site and these communities, thereby minimizing project-related traffic on the Searchlight Access Route and north along U.S. Highway 95 from Searchlight.

3. The proposed Castle Mountain Project would generate an average of six truck trips per day to the site for delivery of materials and fuel. Truck traffic is expected to be higher in the early years of operations, when power for onsite facilities would be provided by fuel-fired generators and fuel deliveries would be by truck. Trucks would use the Ivanpah Access Route, since most would approach the site using the Nipton interchange on Interstate 15. Truck traffic also may include trips made between the project site and the rail siding at Ivanpah for materials to be transported by rail.

4. Access roadways, including the proposed Ivanpah Access Route and Searchlight Access Route, would be improved dirt and gravel roads as described in Table 3.2.4, Proposed Access Improvements. During the operational periods, it is expected that these roads may experience increased recreational traffic, especially during the seasonal winter/spring peak recreation period and on 3- and 4-day holiday weekends. In particular, the County maintained portion of the Searchlight Access Route, which is part of the East Mojave Heritage Trail, could attract more recreational use. The proposed bus/van pool system to be provided to employees by the Applicant would reduce project-related traffic along the Searchlight Access Route.

5.12.1.2 Utilities

1. Utilities at the Castle Mountain Project site would be self supporting. The project water supply would be obtained from a well field northwest of the mine operations area and transported to the project site by a buried pipeline. Wastewater disposal would be accomplished using septic tanks and leach fields at sites of concentrated activity, such as the processing plant, and mine maintenance shop. Portable facilities would be used in more remote locations, such as at the mine pits. Power would be provided by the Applicant.

2. The limited number of project employees would have a minimal cumulative impact on municipal utility system requirements in communities of south Clark County and Las Vegas valley. These impacts on municipal utility systems are not expected to be sufficient in themselves to require new or expanded water sources and delivery systems or new or expanded wastewater collection and treatment facilities. No significant impact to public utilities is therefore expected.

5.12.1.3 Energy Resources

1. The proposed Castle Mountain Project would generate a need for energy resources at the project site both during the construction and operations phases. Principal energy needs at the site would include diesel, propane and gasoline fuels to operate motorized equipment and generate onsite electrical power. Electricity would be required to operate crushing, pumping, and process equipment, and to provide site lighting. Average energy requirements are approximately 3,000 kilowatts of power.

2. After the initial years of operation, the Applicant plans to obtain fuel for onsite power generation from offsite sources via a natural gas line to be extended to the site from sources near Searchlight, Nevada. The line would be laid in the Searchlight Access Route alignment so that no additional disturbance would occur.

5.12.2 IVANPAH ACCESS ROUTE ALTERNATIVE

5.12.2.1 Transportation

1. Potential project traffic impacts with the Ivanpah Access Route Alternative differ from those of the proposed action with respect to trip distribution on the access routes and adjoining roadways. In this alternative, project traffic is more likely to use Interstate 15 and the Ivanpah Road for access, thereby increasing overall traffic on these roadways. Concurrently, less project-related traffic would occur on U.S. Highway 95.

2. This alternative would increase the potential impact on the Ivanpah Access Route while reducing the potential impact on the Searchlight Access Route. Potential impacts would be reduced through the project bus/van pool service. This redistribution of traffic would not substantially impact the carrying capacity of these roadways.

5.12.2.2 Utilities

1. The project utility requirements would not differ from the proposed action. Improvements along the Searchlight Access Route would be limited to the future natural gas pipeline.

2. Since this alternative may encourage a greater number of project-related personnel to live in the western Las Vegas valley and San Bernardino County desert communities, the project-related cumulative impacts on local utilities could be slightly greater in these areas than if the proposed action project were implemented. However, this cumulative demand would still not be of a magnitude that would require new utility improvements.

5.12.2.3 Energy

1. The energy impacts of the Ivanpah Access Route Alternative would not substantially differ from impacts of the proposed action. Energy use for operations at the project site would be identical to the proposed action. Additional gasoline may be used if employees chose to live in

communities along U.S. Highway 95 since an additional 30 miles would be added to their commute using State Route 164 and Ivanpah Road instead of the Searchlight Access Route.

5.12.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. The project site would remain in its present state and would be available for future development proposals. No increased potential for impacts to infrastructure would occur.

CHAPTER 6.0
MITIGATION MEASURES

6.0 MITIGATION MEASURES

1. This chapter has been prepared in compliance with the CEQA guidelines that require separate discussion of mitigation measures. It reiterates the specific measures that would be employed to mitigate the potential adverse impacts that could result from implementation of the Castle Mountain Project.

6.1 INTRODUCTION

1. Methods available to mitigate potential environmental impacts generally include:

- Avoiding the impact altogether by not taking a certain action or parts of an action.
- Minimizing impacts by limiting the degree or magnitude of an action.
- Rectifying the impact by repairing, rehabilitating, or reclaiming the impacted environment.
- Reducing or eliminating the impact over time by preservation and maintenance.
- Compensating for the impact by replacing or providing substitute resources or environments.

2. Many measures designed to reduce potential environmental impacts would be implemented through existing agency rules and regulations (see Section 2.4, Regulatory Compliance). Since these requirements are in effect and would automatically be imposed on the project, they are not specifically evaluated in this EIS/EIR. Preliminary planning and design efforts for the Castle Mountain Project have incorporated provisions for compliance with these rules and regulations (see Section 3.2, Description of the Proposed Action).

3. In addition to the regulatory requirements, the evaluations completed in Chapter 5.0, Potential Environmental Impacts, identified specific mitigation measures that would cover the range of impacts anticipated. Measures were developed for impacts that by themselves would not be considered significant. The effectiveness of these measures has been considered in the impact evaluation, and it was determined that they would reduce or eliminate the identified effects of the project so that no significant impact would occur. The Applicant has committed to incorporate the identified measures into final design plans and operational procedures.

4. Impacts identified for the Ivanpah Access Route Alternative would be similar to those for the proposed action and the mitigation measures are therefore generally applicable. The Ivanpah Access Route Alternative is addressed in each section and the differences for applicable mitigation are noted. The No Action Alternative is similarly addressed.

5. In accordance with State of California Public Resources Code Section 21081.6, a monitoring program would be developed to demonstrate compliance with measures adopted as conditions of approval to avoid significant effects on the environment. The program would, at minimum, identify what measure was undertaken, when it was completed, and the agency having jurisdiction by law over the natural resource.

6. The following sections identify regulatory and project-specific mitigation measures according to the format:

    - <u>Regulatory Framework</u> - A brief statement on the responsible agency and the type of requirements that would be imposed for specific elements of the project.
    - <u>Measures Incorporated by Project Design</u> - Measures are described that have been determined through design plans, the public scoping process, and this investigation.

6.2 GEOLOGY

6.2.1 PROPOSED ACTION

6.2.1.1 Regulatory Framework

1. The potential for earthquake ground shaking at the project site cannot be avoided. Facilities design shall be submitted to the San Bernardino County Office of Building and Safety for review and approval and will be designed to withstand the effects of ground shaking as required by the Uniform Building Code and other applicable local seismic codes and ordinances.

6.2.1.2 Measures Incorporated by Project Design

Mineral Resources

1. Project facilities shall be located such that landslides which might be induced by earthquakes will not encroach into areas where potentially hazardous chemicals are stored, ponded, or processed. Within the open pit mines, potential rock falls and slide areas are normally identified during excavation. Slopes shall be stabilized or abandoned. This would be aided by constructing engineered pit walls at safe slopes considering the geologic structure and the exposed rock properties.

Paleontological Resources

1. The Applicant shall contract an individual qualified in the assessment of woodrat middens to inventory the project site for these resources prior to initiation of operation. If located, middens would be assessed for potential paleontological value and extracted, if appropriate, at the discretion of BLM and stored at an approved repository.

6.2.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the Castle Mountain Project, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that general alignment. Mitigation measures identified for the proposed action, as described above, would be applicable.

6.2.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. Since no increased potential for hazardous geologic conditions or impacts to paleontological resources would occur, no mitigation measures would be necessary.

6.3 WATER RESOURCES

6.3.1 PROPOSED ACTION

6.3.1.1 Regulatory Framework

1. The Clean Water Act is administered by the U.S. Environmental Protection Agency (EPA), which delegates authority to the State Water Resources Control Board and, ultimately, to the Regional Water Quality Control Board (RWQCB), Colorado River Basin. The RWQCB would regulate project systems with the potential to discharge liquids to surface or subsurface waters. The review and permitting process would follow requirements of the California Administrative Code, Title 23, Subchapter 15, Article 7 (Mining, Waste Management), and the California Porter-Cologne Water Quality Act of 1985.

2. In compliance with applicable regulations, the RWQCB would require the use of materials and implementation of procedures to safely contain liquids, in order to achieve the closed discharge system proposed for the project. These requirements would include:

   - Impermeable synthetic liners for process solution ponds and heap leach pads.
   - Sealed drainage and collection facilities to transport or contain leaching solution.
   - Diked leach pads to confine and control drainage from the leach piles.
   - Solution ponds with adequate freeboard to safely contain storm run-off from within the heap leach system and draindown of solution from the leach pads in the event pumps could not operate because of a power failure.
   - Drainage or diversion ditches outside the heap leach system to preclude entry of storm run-off into the system.
   - A leakage detection monitoring system for the leach pads and ponds.
   - Regularly prepared monitoring reports on the current status of operations.
   - Neutralization of the heap leach piles and elimination of the solution ponds at the time of abandonment.

3. A permit would be required from the California Department of Fish and Game in accordance with Fish and Game Code (Sections 1601-1607) if construction is to divert, obstruct, or

change the natural flow of a stream or wash where an existing fish or wildlife resource would be substantially effected. The facilities plan has been arranged to avoid alteration to the only substantial drainage onsite (in the vicinity of the heap leach pads).

6.3.1.2 Measures Incorporated by Project Design

1. Project water requirements shall be minimized by the following operational procedures:

   - Crushing the ore to optimize leaching time so that less water would be circulated and related evaporation would be reduced.
   - Employing the drip irrigation method to apply solution to most of the heap leach surface. This would reduce evaporation, compared to the more conventional spray application technique.

2. The amount of ground water extracted from the West Well Field wells shall be recorded by metering the total flow pumped from each well. Also, the static ground water level for each pumping well and three monitoring wells at the perimeter of the well field shall be measured on an annual basis and reported to BLM. If the amount of drawdown at the three monitoring wells exceeds the 60 feet estimate discussed in Section 5.3.1.2, the prior modeling of the well field shall be reevaluated using aquifer properties determined from the pumped well and drawdown data, to assure that predictions of no noticeable effect at Piute Spring remain valid.

3. If any existing wells in Lanfair Valley within 10 miles of the West Well Field go dry as a result of the proposed Castle Mountain project operations, the Applicant shall pay the costs to have these wells deepened, or shall otherwise provide replacement water to the owner of the affected wells.

4. The heap leach piles shall be located to avoid disruption of the large drainage that passes through the western portion of the project site. Minor drainages that would be restricted by heap pad construction would be diverted around the heap piles.

5. Reagents and fuels shall be stored in areas protected by dikes or curbs designed to contain the contents of containers to avoid the potential for an accidental spill to effect water quality.

6. Reclamation activities shall include control of slopes on cuts and fills, plus revegetation to control surface erosion.

6.3.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include development of the proposed action, but no road improvements along the Searchlight Access Route would be completed. The natural gas pipeline would still follow that general alignment. Measures identified for the proposed action would be applicable, as described above.

6.3.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. Since no increased potential for impacts to ground water would occur, no mitigation measures would be necessary.

6.4 VEGETATION

6.4.1 PROPOSED ACTION

1. As described in Section 5.4, literature reviews and onsite inventories have demonstrated that no threatened or endangered plant species are expected to occur on or in the vicinity of the proposed project site. While the onsite vegetation and wildlife habitat is not unique and is a small portion of that available in Lanfair Valley and surrounding region, the Federal Land Policy Management Act (FLPMA) designates wildlife development and utilization as one of several activities that constitutes a principal use of the public lands. As such, the U.S. Bureau of Land Management (BLM) is required to manage for these uses. In addition, reclamation of disturbed land is required by the California Surface Mining and Reclamation Act (SMARA). Reestablishment of the affected habitat is therefore planned.

2. Measures to mitigate potential impacts to vegetation are described below as they relate to local, State, and Federal government regulations. Additional measures have also been incorporated into the design of the project to minimize disturbances and facilitate vegetation recovery. Implementation of these measures would reduce the impact of vegetation disturbance to an acceptable level.

6.4.1.1 Regulatory Framework

1. The potential impact to plant species is subject to the Federal Endangered Species Act (ESA) which extends legal protection to plants listed or officially proposed to be listed as endangered or threatened. The project will be reviewed for ESA compliance by the FWS. Plants listed as endangered or threatened, as well as candidate species, are also afforded protection by the California Endangered Species Act and the Native Plant Protection Act, as administered by the California Department of Fish and Game. No listed plants or plants officially proposed to be listed occur on the project site.

2. BLM is responsible for preventing undue degradation of Federal lands in accordance with 43 CFR 3809 regulations. The County of San Bernardino is responsible for implementing SMARA. As directed by these agencies, the Applicant would implement a revegetation program designed in conformance with the objectives of Federal and State policies for reclamation. Revegetation of the majority of disturbed areas including the heap leach piles, overburden pile, process areas, solution ponds, and onsite roads as well as the Searchlight

Access Route would be accomplished. The reclamation and revegetation activities would be monitored by BLM and the County for compliance with Federal and State regulations.

6.4.1.2 Measures Incorporated by Project Design

1. In order to maximize the success and reduce the time of revegetation, the Applicant shall develop a revegetation research program based upon information provided by qualified experts in desert flora. This research program shall include measures such as:

    - Review available materials describing methods and success rates of revegetation programs employed on other lands in the arid west to determine the best available procedures.
    - Development of the methodology for research and a schedule for implementation of the revegetation program for submittal to BLM and the County within the first year of project operation.
    - Establishment of goals for vegetation recovery, including vegetation cover, species composition on different landforms, and time frames for achievement. The goals would be periodically reevaluated and adjusted as necessary during implementation, the objective being to work towards reestablishment of pre-disturbance cover.
    - Stockpiling of available soil. Redistribution of soils over disturbed areas would be completed following completion of activities on an area. Studies would be completed to determine where available soil would be most effectively used.
    - Identification of dominant species to be used in revegetation including *Larrea tridentata*, *Ambrosia dumosa*, *Hymenoclea salsola*, and grass species such as *Hilaria jamesii* and *Oryzopsis hymenoides*. Salvaging of individuals of species amenable to transplantation, such as small Joshua trees and barrel cactus, would be completed and plants would be kept in nursery areas for replanting on reclaimed areas to provide a continuous seed source. A goal would be to transplant at least 25 percent of barrel cactus and 25 percent of all Joshua trees under four feet tall.
    - Selection of a site appropriate for a nursery. Considerations would include water availability, access, and other requirements determined by the revegetation experts. A preliminary site could be within the soil storage area located adjacent to the southwest leach pad (see Figure 3.2.5, Preliminary Site Plan). Other areas to be disturbed for soil storage could also be used as nursery sites depending upon the total acreage required.
    - Development of a plan to coordinate and phase revegetation efforts in accordance with mining and processing operations. A goal would be to initiate revegetation procedures within six months following completion of project activities over an area.
    - Monitoring for potential invasion of exotic species. If exotic species densities exceed those of nearby previously disturbed areas, a program of weed control acceptable to the County and BLM would be implemented.

- Employment of reseeding, transplantation, fertilizing, and watering procedures determined appropriate for each disturbed area in the program methodology.
- Evaluate the benefits of removing, shredding, and composting vegetation that would otherwise be lost.
- Ground preparation procedures would include ripping and harrowing of compacted soils. Criteria for slope gradients would be determined through onsite research on revegetation success.
- Development of a long-term monitoring program following project completion to verify revegetation results based upon the goals for species composition and cover and to determine what additional measures (including watering and reseeding) would be necessary.

2. Complete reestablishment of desert vegetation to pre-disturbance cover and composition is expected to be a lengthy process. Therefore, revegetation efforts shall be initiated as soon as possible during the project operation period, as use of specific disturbed areas is completed. Further, the program shall continue to complete and monitor revegetation efforts following project completion in order to maximize the program's success. The time frame for such monitoring shall be assessed in conjunction with the establishment of research program goals, and determined by BLM based upon the success experienced during the project operational period.

3. The BLM monitors unusual plant assemblages (UPAs) a minimum of once each year, in accordance with individual assemblage monitoring plans. Proposed actions which would affect an assemblage are evaluated by BLM on a case-by-case basis and, if necessary, mitigating measures are developed to avoid adverse impacts. The project revegetation program shall collect and provide data on revegetation and recovery of the desert grassland assemblage and provide such data to BLM to supplement UPA monitoring and planning strategies.

4. At the discretion of BLM and the County, reseeded areas shall be fenced to prevent livestock use during reclamation. The Applicant shall be responsible for removing these fences following reclamation.

5. Vegetation considered unnecessary for reclamation shall be made available for public collection through plant salvages conducted by BLM.

6. Revegetation shall include some areas within the project boundary and along access roads that were disturbed by the actions of third parties prior to the time that reclamation of such

disturbances was required under FLPMA and SMARA. Existing routes that would be bypassed by new roads in the Searchlight Corridor will also be candidates for reclamation. Decisions as to which areas should be reclaimed would be made in conjunction with BLM and the County following a field evaluation.

6.4.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the Castle Mountain Project, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that general alignment. Mitigation measures identified for the proposed action site as described above would be applicable. Reclamation and revegetation along the Searchlight Access Route would be limited to that necessary for the gas pipeline.

6.4.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. Since no increased potential for impacts to vegetation would occur, no mitigation measures would be necessary.

2. Areas within the project boundary which were disturbed by third parties, prior to the time reclamation was required under FLPMA and SMARA, would not be reclaimed.

6.5 WILDLIFE

6.5.1 PROPOSED ACTION

1. As described in Section 5.5, literature reviews and onsite inventories have demonstrated that no wildlife species listed as threatened or endangered occur on or in the vicinity of the proposed Castle Mountain Project site. However, some special interest wildlife species recognized by State and Federal agencies would be indirectly affected by reduction of habitat quality through vegetation removal (birds, desert tortoise, bighorn sheep) or possibly by destruction of mine shaft habitat (bats).

2. For other more common species of animals, wildlife habitat quality would be reduced in areas disturbed by project operations. While the onsite habitat is not unique and is a small portion of that available in Lanfair Valley and surrounding region, reclamation of the affected habitat is nonetheless required.

3. Measures to mitigate potential impacts to wildlife and wildlife habitat are described below as they relate to local, State, and Federal government regulations, and as additional measures which have been incorporated into the design of the project. These measures, if required as conditions for approving the Castle Mountain Project, would reduce the identified wildlife impacts to an acceptable level.

6.5.1.1 Regulatory Framework

1. The potential impact to wildlife species is subject to the Federal Endangered Species Act (ESA) which extends legal protection to animals listed as threatened or endangered or officially proposed to be listed as threatened or endangered. Animals listed as threatened or endangered, as well as candidate species, are also afforded protection by the California Endangered Species Act as administered by the California Department of Fish and Game. No currently listed, threatened or endangered species or their habitat occur on the site. The U.S. Fish and Wildlife Service (FWS) will review this document for ESA compliance.

2. The Federal Land Policy Management Act (FLPMA) designates wildlife development and utilization, and several other activities as principle uses of the public lands, and as such, Congress has instructed BLM to manage the public lands for these uses. BLM is responsible for implementing 43 CFR 3809 regulations that prohibit "unnecessary or undue degradation"

of public lands. The County of San Bernardino is responsible for implementing the California Surface Mining and Reclamation Act (SMARA). As part of the required reclamation program, site revegetation would be undertaken to reestablish wildlife habitat. The implementation and effectiveness of this program would be monitored by the BLM and the County. An outline of procedures for this program was given in Section 6.4, Vegetation.

6.5.1.2 Measures Incorporated by Project Design

1. A program to educate employees about area wildlife shall be implemented by the Applicant in connection with the safety program for construction workers and employees. The program would acquaint personnel with laws protecting vegetation and wildlife, the characteristics of desert wildlife, and proper procedures should wildlife be encountered. Drivers shall be educated about potential hazards of desert road driving, driving at proper speeds, and the importance of not harassing or otherwise interfering with wildlife, especially the desert tortoise. Employees shall comply with BLM open/closed area designations and road regulations.

2. An environmental specialist or contracted consultant would be employed by the Applicant to monitor the effectiveness of wildlife mitigation measures and the revegetation program. Results would be reported to BLM on a regular basis at least quarterly.

3. Specific measures incorporated in the project design are described in the following paragraphs where designed for a particular element of the project, or for a particular wildlife species.

Cyanide Solution

1. Measures to isolate cyanide processing solutions from wildlife have been incorporated in project preliminary design plans. Specific measures to be employed shall be tested for their effectiveness in an ongoing evaluation program after commencement of operations.

   - Solution Ponds

     - Fencing - Storage ponds shall be fenced. The design provides for chain link fencing enclosing the ponds to exclude terrestrial animals. Sheet metal shall be extended around the base of the chain link fencing and buried to exclude small and/or burrowing animals.

- Netting - Measures to discourage birds and bats shall include covering with netting with close-spaced (1-inch or less) mesh, or liner material. The cover shall be arranged to avoid potential exposure at edges of ponds.

• Heap Piles

- Fencing - Heaps shall be fenced with barbed wire.
- Irrigation - Drip irrigation methods shall be used to distribute solution directly on top of heaps. This will minimize the potential exposure to sprays and droplets and ponding of water available to birds or other animals. Use of conventional sprinklers shall be limited to sides of heap piles where no ponding would occur.

• Solution Handling

- The cyanide solution system shall be operated as a closed circuit, with solution transported from heap piles, to storage ponds, to processing plant, and back to the heap piles in a system of pipes, rather than open ditches. Open ditches would be used only to carry heavy storm run-off.

Water Use

1. Anticipated project water use has been substantially reduced by converting leachate distribution plans from sprinklers to drip irrigation. No noticeable impact on Piute Spring or its unique habitat is expected.

Desert Tortoise

1. The Applicant shall locate and flag onsite tortoise burrows prior to initiating surface disturbing activities. Flagged areas shall be avoided whenever possible. If occupied burrows are within areas designated for project facilities, relocation of tortoises shall be coordinated with BLM. The Applicant shall inform project personnel as to proper methods for handling tortoises and of their protected status.

2. A project-sponsored program of bus/van pooling to the project from locations in the Las Vegas valley shall be implemented. This would reduce project traffic and potential impacts on desert tortoise and other wildlife populations in Ivanpah and Piute Valleys.

3. To mitigate the project's contribution to the cumulative traffic impact on the desert tortoise, the Applicant shall construct tortoise fencing in crucial habitat along portions of Clark County

Road A68P and Ivanpah Road. The length of fencing to be constructed by the Applicant shall be determined by BLM based upon the length of road through crucial habitat, tortoises densities and portion of anticipated project traffic on each road. Where appropriate, cattle fencing and cattle guards would be incorporated into tortoise fencing design to maintain cattle movement patterns. Specific fence lengths, height (above and below ground), fence locations, location of culverts, and construction standards shall be developed based upon recommendations and specifications acceptable to BLM. Fencing shall be checked regularly for status, and repairs shall be made where necessary to maintain proper function.

4. Prior to project implementation, the Applicant shall complete an initial inventory of desert tortoise densities along the portions of the Ivanpah Access Route and Searchlight Access Route to be fenced in a manner acceptable to BLM. Inventories shall be repeated once each year during the life of the project to determine the effectiveness of tortoise-proof fencing and need for culverts. If, after about three years of study, BLM determines that the fencing is not at least mitigating the impact of project traffic, additional fencing and/or culverts may be required.

5. At the discretion of BLM, funds equivalent to the calculated fencing costs could be contributed by the Applicant as an alternative to fencing, for use in habitat enhancement, land acquisition, or studies to benefit the desert tortoise.

<u>Lighting</u>

1. Outdoor lighting for the mine pits and other areas of nighttime activities shall be shielded to reduce fugitive light. The shielded lights shall limit direct lighting to the area of activity, thereby reducing the potential attraction of animals.

<u>Guzzler Relocation</u>

1. To reduce disturbance to wildlife and avoid attracting wildlife to the area of activities, two wildlife guzzlers shall be relocated to appropriate locations determined by BLM. The wildlife guzzler located along the Searchlight access road shall be relocated. The wildlife guzzler (#B-79) northwest of the project site shall also be relocated.

Ravens

1. Project waste shall be properly managed and the site monitored to control human garbage that could attract ravens. Garbage shall be kept in containers designed to exclude wildlife prior to landfill disposal.

2. As part of the onsite biological monitoring, raven populations in the project vicinity shall be monitored by the project environmental specialist, as these birds are potential predators on young desert tortoises. Results shall be reported to BLM to assess if unusual increases in raven population numbers are occurring.

Bats

1. An examination of the shafts and adits shall be completed prior to earth-moving activities in the area in order to estimate the likelihood that they are occupied by bats or other species. The evaluation shall be completed during the winter hibernating period by an ecologist familiar with bat fauna. Should a colony be found, or substantial use by individual bats be indicated, blasting or heavy equipment use shall be restricted at or adjacent to the roost sites during the identified period of occupation. If the habitat used by a colony would be required for project development, a mitigation program shall be completed. This could include such measures as monitoring to determine if occupation of alternate roost sites within the project site boundaries is occurring, and netting of bats to identify changes in use patterns of species.

2. To allow access to abandoned mine workings used as habitat by bats and other animals, adits and shafts on the project site that do not pose a hazard to people shall either be left open or barricaded in a manner acceptable to BLM to permit animal ingress/egress.

Raptors

1. As mining operations progress, ledges in pit walls shall be constructed for raptor nesting and roosting ledges. A BLM wildlife biologist would provide guidance for such activity.

2. Design and construction of electric power distribution poles shall incorporate provisions for raptor safety.

6.5.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. The Alternative would include implementation of the proposed action, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that general alignment. Mitigation measures identified for the proposed project site as described above would be applicable. Traffic monitoring or desert tortoise mitigation measures along the Searchlight Access Route would not be necessary. The length of tortoise fencing to be constructed along Ivanpah Road would be extended, based upon the additional percentage of traffic.

6.5.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. Since no increased potential for impacts to wildlife would occur, no mitigation measures would be necessary.

6.6 AIR QUALITY

6.6.1 PROPOSED ACTION

6.6.1.1 Regulatory Framework

1. Construction and operation of the proposed Castle Mountain Project would be subject to Federal, State, and County rules and regulations, as implemented through the provisions of the Clean Air Act of 1971, pertaining to the control of air pollutants emitted to the atmosphere. Region IX of the U.S. Environmental Protection Agency (EPA) in San Francisco, California, has Federal jurisdiction over the area. The California Air Resources Board (CARB) is responsible at the State level. At the local level, the San Bernardino County Air Pollution Control District (SBCAPCD) has authority over sources of air pollutants emitted in the area.

2. The CARB serves as a technical review and advisory agency, providing technical advice to SBCAPCD when necessary, and offering guidance when County regulations are not sufficiently detailed to address a particular problem. Under the provisions of the Clean Air Act, SBCAPCD has fulfilled Federal requirements that allow a local agency to administer Federal Clean Air Act policies. Thus, SBCAPCD would have primary regulatory review authority over potential sources of air pollution associated with the proposed action.

6.6.1.2 Measures Incorporated by Project Design

Fugitive Dust Control

1. A number of measures would be incorporated into the project design to control the generation of PM_{10} particles. These include:

   - Haul roads within the site boundary shall be surfaced with durable gravel and shall be well maintained.
   - Water or surface binding agents shall be applied to haul and access roads within the site boundary as needed, depending on traffic volumes, ambient wind, and climatological conditions.
   - Speed restrictions shall be enforced on mine roads to minimize surface disturbance of the roadways.
   - Unauthorized vehicle travel shall be restricted within the site boundary to minimize surface disturbance of the roadways.

- Vehicle travel to and from the project site shall be reduced by the promotion of van pools/busing for workers.
- During all drilling operations, air drilling equipment shall be shrouded with standard debris collecting devices and/or wet drilling techniques. Manufacturer specifications for all shrouding devices shall be submitted to the SBCAPCD for review prior to use. The debris collecting devices shall have a minimum design efficiency of 90 percent.
- The live storage portion of the coarse ore stockpile shall be covered to minimize wind-blown dust.
- Blasting during high winds shall be minimized or curtailed to minimize wind-blown dust.
- The primary, secondary, and tertiary crushers, screens, and all transfer points shall be completely enclosed or shrouded to minimize exposure to wind and, at a minimum, shall use spray bars to control fugitive dust emissions. Conveyors shall be enclosed in selected areas where the moisture content and/or consistency of the material would allow generation of wind-blown dust. High pressure agglomerative dust suppression systems utilizing chemical surfactants to reduce surface tension shall be used in areas of high particulate emission potential, such as the crusher discharges and the primary, secondary, and tertiary screens. Specifications for these systems shall be submitted to the district for review prior to installation.

2. Revegetation efforts for completed portions of the overburden pile and decommissioned heap leach piles shall be initiated during the operational period rather than deferring reclamation and revegetation until operations are completed.

3. As required by the SBCAPCD, PM_{10} concentrations shall be monitored at several locations near the project boundaries. The monitoring data shall be routinely submitted to that agency to demonstrate that the project is not causing ambient standards to be exceeded.

<u>Fuel Use Emissions Control</u>

1. The majority of onsite power would be generated using propane or natural gas. These sources are generally recognized to be clean burning fuels, with relatively low emission rates. Because of its unique design to reduce combustion temperatures, the type of engine selected for the one required diesel generator would emit only about one-half of the NO_x of comparable engines.

2. Emissions from mobile equipment and vehicular engines shall be controlled by:

   - Using only low sulfur fuels.
   - Implementing a routine maintenance program to avoid operating inefficiencies.
   - Reducing vehicular traffic by providing project-sponsored bus/van pool for the majority of employees.

Hydrogen Cyanide Emissions Control

1. Hydrogen cyanide shall be routinely monitored at the processing facilities as a requirement of the employee health and safety plan implemented according to Mine Safety and Health Administration regulations. These requirements mandate that HCN concentrations be below 10 parts per million. In addition, the Applicant shall periodically perform airborne HCN surveys to verify that potential public exposure to cyanide is inconsequential.

6.6.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the Castle Mountain Project, but without road improvements to the Searchlight Access Route. The natural gas pipeline would still follow that general alignment. Measures identified for the proposed action would be applicable. No dust control measures along the Searchlight Access Route would be necessary.

6.6.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. Since no increased potential for impacts to air quality would occur, no mitigation measures would be necessary.

6.7 ENVIRONMENTAL HEALTH AND SAFETY

6.7.1 PROPOSED ACTION

6.7.1.1 Regulatory Framework

1. Protection of employee and visitor safety during the operational period of the proposed project would be accomplished through basic mine operational procedures. The project would be under the jurisdiction of Mine Safety and Health Administration (MSHA), which enforces standards governing worker training and safety.

2. The Resource Conservation and Recovery Act of 1966 (Part 266) incorporates special standards for handling hazardous materials. The California Code of Regulations, Title 22 (Environmental Health, Chapter 30) also sets standards for the management of hazardous wastes.

3. Rules and regulations set forth by BLM, the Regional Water Quality Control Board (RWQCB), Colorado River Basin, and the County of San Bernardino Department of Environmental Health Services would be followed to ensure that no significant public health hazard would be created. Some of these design measures, rules, and regulations include:

   Facilities Design

   - Heap leach pad and pond liners shall be designed in accordance with RWQCB requirements to prevent release of solution to unprotected soils.
   - Heap leach pads and ponds shall be designed to contain storm precipitation and run-off in accordance with RWQCB requirements.
   - Final rinsing of individual heaps shall occur prior to the ore pile being decommissioned in accordance with BLM and RWQCB requirements.
   - Heap leach and gold recovery processes shall be a zero-discharge system to contain the cyanide solution in a controlled environment.
   - Areas where toxic solutions would be used shall be designed with dikes or curbs to contain potential spills.

   Operational Procedures

   - Non-hazardous waste materials generated on the site shall be disposed at approved facilities.

- Waste oils shall be recycled. Other hazardous wastes shall be disposed offsite, using services and procedures approved by the California Department of Health Services and the U.S. Environmental Protection Agency (EPA).
- Fences shall be erected around potentially hazardous areas to deter entry by unauthorized personnel or visitors.

6.7.1.2 Measures Incorporated by Project Design

1. A spill prevention and contingency plan shall be developed for establishing procedures for spill prevention and cleanup.

2. A vehicle shall be provided at all times onsite for emergency response in the event of an accident. First aid equipment shall be provided at appropriate locations.

3. Personnel trained in security shall be onsite on a 24-hour basis to deter entry to potentially hazardous areas by unauthorized persons.

4. Training programs shall be implemented to familiarize personnel with their specific jobs, handling of hazardous substances such as cyanide, and first aid procedures.

5. The Applicant shall provide road improvements and implement a regular maintenance program along currently unmaintained or irregularly maintained portions of the Ivanpah Access Route and Searchlight Access Route in a manner acceptable to BLM. A maximum speed limit of 35 miles per hour shall be posted.

6. Transport of hazardous materials to the site shall be limited to daylight hours, Monday through Friday.

6.7.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the proposed action, but no Searchlight Access Route road improvements would be completed and no road maintenance would be required along that route. The natural gas pipeline would still follow that general alignment. Other measures identified for the proposed project and the Ivanpah Access Route would be applicable, as described above. No additional measures would be necessary.

6.7.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. Since no increased potential for impacts to public health and safety would occur, no mitigation measures would be necessary.

6.8 VISUAL RESOURCES

6.8.1 PROPOSED ACTION

6.8.1.1 Regulatory Framework

1. The 43 CFR 3809 regulations define standards for reclamation of mining operations on Federal lands. These standards include procedures that would result in beneficial visual reclamation including reshaping and revegetation of disturbed areas. A comprehensive site reclamation plan would be implemented by the Applicant in accordance with these regulations.

2. Scenic quality on lands under BLM jurisdiction is managed through the Visual Resource Management (VRM) Program (BLM, 1988b). Proposed actions are evaluated with respect to classifications based on a contrast rating system that considers scenic quality and sensitivity of an area, according to defined VRM classes. Compliance with VRM objectives has in part been demonstrated through the visual impact analysis in this EIS/EIR.

6.8.1.2 Measures Incorporated by Project Design

1. In the East Mojave National Scenic Area (EMNSA), non-discretionary actions (such as mining) are required to be designed to be as visually unobtrusive as "best practices" allow, in conformance with the EMNSA Management Plan. In accordance with this requirement, project design measures have included visual considerations.

Site Plan

1. Overburden and heap leach piles have been planned for locations that would minimize the degree to which they are seen from sensitive viewpoints such as WSA 266, and the more heavily traveled roads in Lanfair Valley. The overburden site would be located on an outwash slope bounded by small hills. This intervening topography would attenuate the visual impact of overburden and provide a natural skyline. Heap leach piles would form low mesas consistent with alluvial terrace landforms near the Valley floor.

Operational Activities and Equipment

1. Operation structures shall be painted to blend with the predominant background as viewed from surrounding roads. Colors used shall be selected by BLM.

2. Water and dust inhibiting agents shall be employed as needed to reduce the potential visual impact of fugitive dust during the operational period.

3. Outdoor lighting for mine pits and other areas of nighttime activities shall be shielded to reduce fugitive light. The shielded lights shall limit lighting to the area of activity, thereby reducing the visual impact of nighttime operations.

4. The Applicant shall remove all operating facilities, including structures, equipment, transmission lines, and fencing at project completion, in conformance with reclamation plan requirements.

Reclamation

1. Site reclamation shall include modification of final overburden and heap leach pile shapes to reduce the impact of straight-line geometrics and potential contrast in form and line. Surfaces shall be designed to be as visually unobtrusive as best practices allow.

2. Rock staining solutions shall be used on the upper mine pit walls. These solutions shall be specifically colored to reduce the contrast between the pit walls and the surrounding undisturbed slopes.

3. A revegetation program shall be implemented in accordance with the reclamation plan. As vegetation becomes established, the color contrast of the overburden and heap leach piles would be reduced. The revegetation program shall be developed and implemented using the most recent techniques for successful revegetation in desert environments.

4. Revegetation shall include some areas within the project boundary and along access roads that were disturbed by the actions and third parties prior to the time that reclamation of such disturbances was required under the Federal Land Policy Management Act (FLPMA) and the California Surface Mining and Reclamation Act (SMARA). The big Chief Hill clay pit shall be reclaimed using overburden, and rock staining on the upper pit wall. Existing routes that

would be bypassed by new roads in the Searchlight Corridor will also be candidates for reclamation. Decisions as to which areas should be reclaimed would be made in conjunction with BLM and the County following a field evaluation.

6.8.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the proposed action, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that general alignment. Reclamation and revegetation for its construction would be required. Other measures incorporated for the proposed action would be applicable. No additional measures would be necessary.

6.8.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. Since no increased potential for impacts to visual resources would occur, no mitigation measures would be necessary.

2. Areas within the project boundary that were disturbed by third parties prior to the time reclamation was required under FLPMA and SMARA would not be reclaimed.

6.9 CULTURAL RESOURCES

6.9.1 PROPOSED ACTION

6.9.1.1 Regulatory Framework

1. An action is considered to have an adverse impact when its effect on eligible cultural properties may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. An effect may be considered not adverse, pursuant to 36 CFR 800.9(c), when the property is of value only for its potential contribution to research (i.e. meeting National Register of Historic Places [NRHP] criterion d) and when such value can be substantially preserved through the conduct of appropriate research. No data recovery mitigation provision is afforded for adverse effect determinations where properties meet NRHP criteria a, b, or c (as identified in Section 5.9.1). However, under certain circumstances, other types of mitigation may contribute to a determination of "No Adverse Effect."

2. The characteristics of the cultural resources within the proposed project area indicate that, due to the variance in the sites, both data recovery and avoidance are appropriate mitigation measures.

6.9.1.2 Measures Incorporated by Project Design

Mitigation and Data Recovery Measures

1. Data recovery has been recommended as an appropriate course of action for five aboriginal sites in the vicinity of the proposed Searchlight Access Route and the proposed project operations area, as shown in Table 6.9.1, Preliminary Summary of Proposed Data Recovery Program for Aboriginal Sites. These five sites include resources that may be directly affected by the construction of the Searchlight Access Route and project facilities, mining operations, increased visibility, and/or human activity in the area, whether directly or indirectly related to the project.

2. For these five sites, actions to be undertaken include field work, laboratory studies, and documentation of research results. Pursuant to State and Federal law, recovered resources

TABLE 6.9.1

PRELIMINARY SUMMARY OF PROPOSED DATA RECOVERY PROGRAM FOR ABORIGINAL SITES

MITIGATION	SITE TYPE	FIELD WORK	SPECIAL ANALYSES*	RESEARCH GOALS AND PROBLEMS
DATA RECOVERY				
SBr-6055/6054	Camp	Map, surface collect, excavate	Flotation, obsidian sourcing, faunal analysis	Seasonality, subsistence, technological adaptions
26-CK-3849 (Juan Obsidian Source)	Quarry	100% surface collection in corridor	Replicative studies, chemical characterization of obsidian by X-ray fluorescence	Technological adaptions
SBr-5705, -5706, -5707	Quarries	Controlled collection	Replicative experiments including heat treatment and reduction, technological analysis	Technological adaptions
SPARSE LITHIC SCATTER PROGRAM**				
SBr-5872, -5708	Material prospects	Detailed recordation	Programmatic data acquisition: sparce lithic scatters	Absence of significant data?

*Radiocarbon dating will be applied whenever and wherever appropriate samples are obtained.
**Application of this program subject to BLM and SHPO concurrence.

shall be curated at specific institutions, including the University of California at Riverside and the Nevada State Museum in Carson City or its designate. Research findings may be submitted for publication in appropriate professional journals.

3. Two aboriginal sites (CA-SBr-5872 and CA-SBr-5708) will be evaluated by application of the Sparse Lithic Scatter program.

4. Determinations of NRHP eligibility and effect with respect to four historic sites (CA-SBr-3040H, -3060H, -5710H and CA-SBr-3047H/26-Ck-3873) have not been reached by BLM and California and Nevada SHPOs. Upon determination, any required mitigation measures for these sites will be incorporated into the Final EIS/EIR.

5. Additional measures have been recommended to protect certain cultural resources in the vicinity of the project site, as follows:

   - Construct a chain link fence, with no gate, around the Hart townsite cemetery and post a descriptive sign within the fence.
   - Implement an informational program for employees in order to increase their awareness of the value of cultural resources and the need for their preservation. This program would be achieved by providing a section on the prehistory and history of the project area in the employee manual. The section would stress the fragility of the archaeological record and the responsibility of employees in preserving these resources. The manual would be updated, as necessary, to reflect new research findings which may occur relative to the history and prehistory of the area.
   - Close/reroute existing accesses not required for operations at those locations of high cultural resource sensitivity in the vicinity of the project.

6.9.1.3 Native Americans

1. Comments submitted by local Native American representatives pertaining to sensitive areas (see Section 4.9.2.3) will be considered in the evaluation process.

6.9.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the proposed project, but no road improvements to the Searchlight Access Route would be completed. However, the natural gas

pipeline would still follow that general alignment under this alternative. Mitigation measures for the project site would be applicable, as described above. Archaeological sites along the Searchlight Access Route would be avoided.

6.9.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be pursued. In such an instance, the potential impacts to the cultural resources sites would not occur, and the area would remain in its present condition. Since no increased potential for impacts to cultural resources would occur, no mitigation measures would be necessary.

2. Sites for which data recovery has been recommended would not be investigated. Efforts to analyze the data to gain a more comprehensive understanding of the types of prehistoric activities and aboriginal cultural adaptations in the arid eastern Mojave Desert region would not be pursued. Implementation of the No Action Alternative, however, would not preclude future evaluation of the area for its cultural resources.

6.10 LAND USE

6.10.1 PROPOSED ACTION

6.10.1.1 Regulatory Framework

1. The BLM, through the California Desert Conservation Area Plan and the East Mojave National Scenic Area (EMNSA) Plan, and the County of San Bernardino, through the San Bernardino County General Plan, Zoning Ordinance, and other local plans and regulations, manage multiple-use activities in the study area. The policy framework of these planning documents recognizes mining as an appropriate activity at the project site, although some features associated with this activity may temporarily conflict with recreation and grazing uses in the area. The means to reduce these conflicts is provided through reclamation policies. Surface reclamation standards and requirements are provided in 43 CFR 3809 regulations implemented and enforced by BLM, and by the California Surface Mining and Reclamation Act of 1975 (SMARA) implemented and enforced by the County of San Bernardino.

6.10.1.2 Measures Incorporated by Project Design

1. The Applicant has agreed to implement a program to reclaim and revegetate some of the disturbed areas already present in the area. These disturbances arose as a consequence of activities prior to the adoption of reclamation requirements under SMARA and 43 CFR 3809. Decisions as to what areas should be reclaimed shall be determined by BLM following a field evaluation.

Mining

1. The Applicant shall ensure that project activities would not preclude access to the clay pits by the owners or operators.

Grazing

1. The Applicant shall construct and maintain fencing to restrict cattle from operational areas and access roads where required by BLM.

2. Cattleguards shall be installed and maintained by the Applicant at points where cattle control fences cross the access roads.

3. If project activities inhibit use of watering facilities by cattle, the Applicant shall provide alternate water sources, in accordance with requirements of BLM.

4. Grazing lessees shall be compensated by the Applicant for livestock killed or injured by vehicles driven by project employees.

5. At the discretion of BLM, the abandoned tank, troughs, and corral in Section 23 shall be removed and disposed of by the Applicant.

Recreation

1. The EMNSA Plan encourages the development of interpretive facilities at key points or areas of interest to interpret features, history, and uses of the East Mojave (Policy C-7). Such points are to be identified in an interpretive plan for the East Mojave. In accordance with this plan, the Applicant shall provide a viewpoint at the Castle Mountain Project site, describing past and present gold mining operations in the area. The interpretive site would be located at a point overlooking both the old Hart townsite and the Lesley Ann pit. The site shall include descriptive information about current mining operations and the history of the Hart Mining District.

2. A historical marker shall be placed along the Searchlight Access Route at a location where the railroad bed of the former Barnwell and Searchlight Railroad is noticeable. The marker shall include a brief description of the history of the railroad.

6.10.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the proposed action, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that alignment. Measures identified for the proposed project site are generally applicable, as described above. The historical marker for the Barnwell and Searchlight Railroad would not be constructed.

6.10.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the proposed action would not be developed. The historical marker for the Barnwell and Searchlight Railroad would not be constructed. Since no increased potential for impacts to existing mining, grazing, recreation, or wilderness land uses would occur, no mitigation measures would be necessary.

6.11 SOCIOECONOMICS

1. No adverse impacts to employment, population, or housing were determined through the impact analysis in Section 5.11. However, the availability at the proposed project of equipment for fire suppression and personnel with first aid training could reduce the potential requirement for emergency response by public service agencies.

6.11.1 PROPOSED ACTION

6.11.1.1 Regulatory Framework

1. The project would be required to comply with applicable State and local codes and ordinances for fire protection, as directed by the County of San Bernardino Fire Department.

6.11.1.2 Measures Incorporated by Project Design

1. The Applicant shall maintain first aid trained personnel and appropriate equipment onsite. Procedures for emergency response shall be developed for use in the event of an accident.

2. Personnel trained in security shall be on duty at all times.

6.11.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the Castle Mountain Project, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that alignment. Mitigation measures identified for the proposed action would be applicable, as described above.

6.11.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. Since no increased potential for impacts to employment, population, housing, or public services would occur, no mitigation measures would be necessary.

6.12 INFRASTRUCTURE

6.12.1 PROPOSED ACTION

6.12.1.1 Regulatory Framework

1. The BLM is responsible for the review and approval of infrastructure improvements on Federal lands. The proposed action would include the design and construction of improvements to dirt roadways. Maintenance of the Ivanpah Access Route and Searchlight Access Route to the project site would be the responsibility of the Applicant. The project would distribute power via single-pole overhead power lines, and water via buried lines. The Applicant will be required to file applications for rights-of-way for roads and water and power lines in accordance with Title V of FLPMA. Design specifications would be submitted to BLM prior to construction.

6.12.1.2 Measures Incorporated by Project Design

1. The proposed action is designed to be self-supporting for utilities. Required road improvements and maintenance would also be provided by the Applicant. Since no impact to public infrastructure is expected, no additional mitigation measures would be necessary.

6.12.2 IVANPAH ACCESS ROUTE ALTERNATIVE

1. This alternative would include implementation of the Castle Mountain Project, but no road improvements to the Searchlight Access Route would be completed. The natural gas pipeline would still follow that alignment. Mitigation measures identified for the proposed action would be applicable, as described above.

6.12.3 NO ACTION ALTERNATIVE

1. Implementation of the No Action Alternative would mean that the Castle Mountain Project would not be developed. Since no increased potential for impacts to infrastructure would occur, no mitigation measures would be necessary.

CHAPTER 7.0
UNAVOIDABLE ADVERSE IMPACTS

7.0 UNAVOIDABLE ADVERSE IMPACTS

1. The detailed analyses of potential adverse environmental impacts were addressed in Chapter 5.0, Potential Environmental Impacts, for the 12 resource categories identified as having public interest through the scoping process. Based upon the regulatory requirements and mitigation measures that would be incorporated in the project design, the identified effects would be mitigable so that no significant impact on the environment would occur (see Chapter 6.0, Mitigation Measures). Some unavoidable adverse impacts would still occur, however, if the project is approved and implemented. These unavoidable effects are summarized in this chapter for the following categories:

   - Water Resources
   - Vegetation
   - Wildlife
   - Air Quality
   - Visual Resources
   - Land Use

   The other six resources (Geology, Cultural Resources, Environmental Health and Safety, Land Use, Socioeconomics, and Infrastructure) are not discussed because related impacts are considered to be positive or are mitigated so that the impact would not be adverse.

2. Unavoidable effects of the Castle Mountain Project and the Ivanpah Access Alternative are discussed concurrently for each topic. Differences in impact are noted, where appropriate. The potential for cumulative impacts related to these unavoidable effects is evaluated in Chapter 8.0, Cumulative Impacts.

7.1 WATER RESOURCES

1. The Castle Mountain Project would use about 450 gpm (725 acre-feet annually) to supply its operational needs. During the period of operation, water would be withdrawn from existing storage in the Lanfair Valley aquifer. The analysis completed for this water use (see Section 5.3, Water Resources) demonstrated that the localized effect of this withdrawal would not restrict other existing uses of the aquifer or flows at Piute Spring. However, use of this resource would mean that a portion of the available water in the Lanfair Valley aquifer would not be available for use by other activities until aquifer recovery through natural recharge were complete (about 30 or more years following project completion).

7.2 VEGETATION

1. The proposed Castle Mountain Project would ultimately affect about 910 acres of land covered by elements of the Joshua tree woodland/creosote bush scrub and blackbush scrub. About 890 acres would be affected by implementation of the Ivanpah Access Alternative. Both the proposed action and its alternative include about 315 acres of the desert grassland unusual plant assemblage. The vegetation in these communities would be initially removed through excavation of mine pits and construction of overburden, and heap leach piles, structures, and haul roads. Revegetation of most of the site (except at the mine pits) is expected to occur over a long period, possibly in the order of 30 to 60 years. The length of time for revegetation will be reduced to the extent practical because required reclamation procedures will be implemented using procedures determined to be appropriate from an onsite revegetation research program (see Section 3.2.8, Reclamation).

7.3 WILDLIFE

1. Implementation of the Castle Mountain Project would incrementally reduce the onsite quality of wildlife habitat as facilities are developed. At project completion, vegetation and habitat removal would total about 890 acres at the site (for the proposed action or Ivanpah Access Alternative) and 20 additional acres along the Searchlight Access Route (for the proposed action) in the blackbush scrub and Joshua tree woodland/creosote bush scrub/desert grassland habitats. These effects could be long-term, although revegetation of these areas is planned to be accomplished over time through the planned revegetation program. Wildlife repopulation of the affected areas would occur following cessation of project activities.

2. Onsite habitats are known to be used by two special interest species: Bendire's thrasher and bighorn sheep. The Bendire's thrasher is a wide-ranging Mojave Desert bird. The removal of some onsite habitat periodically used by this species is unavoidable but would not be substantially detrimental to the continued viability of the species. Individuals of the Castle Mountain/Piute Range population of about 15 bighorn sheep occasionally have been seen on the site. The planned vegetation removal would not significantly affect the available bighorn sheep habitat.

3. Project activities involving use of explosives and equipment would generate noise in the vicinity of the operations. Some animals, such as kangaroo rats and lizards, can be rendered temporarily deaf when subjected to excessive noise, and could thus be more vulnerable to

predation. This impact would occur during the operational life of the project and would generally be limited to locations near to the actual working areas. The affected area is expected to be less than the 2,735-acre project site.

4. In accordance with recent developments in technology, the proposed project has been designed to reduce the potential for exposure of wildlife to cyanide solution. Solution ponds would be surrounded by fencing, covered with netting, the heap leach solution application system would use drip irrigation, and the solution would be transported in closed pipes. While these measures would essentially eliminate wildlife exposure to the solution, some animals still may be able to find points where solution is exposed (such as at the discharge points of drip irrigation pipes) and may be injured or killed if enough solution is ingested. Monitoring of this impact, if it were to occur, would be completed by the Applicant's environmental specialist and reported to the BLM. The impact duration would be limited to the life of the project.

5. Project vehicle traffic along access roads is expected to result in some wildlife fatalities. Of particular concern along these roads is the desert tortoise. The project would increase the level of traffic on Ivanpah Road and Clark County Road A68P for the anticipated 10-year length of its operational life. However, the Applicant will be required to construct fencing along the roads to the extent that tortoise mortalities will actually be reduced. These improvements would continue to reduce mortalities from present levels for the long term, after operation of the Castle Mountain Project is completed.

7.4 AIR QUALITY

1. The proposed project would generate its own power. While generator emissions would be within accepted standards in accordance with the Air Pollution Control District Authority to Construct permit, they would incrementally contribute to reduced level of air quality in the Southeast Desert Air Basin during operation. Also, temporary increase in air particulate levels would also occur during the project's operational period. Water and dust suppresion techniques would be used to maintain the levels below State and Federal standards.

7.5 VISUAL RESOURCES

1. Project activities would be visible from unobstructed viewing locations in Lanfair Valley during the operational period. Onsite equipment and the movement of vehicles may attract the

attention of observers during the daytime. Lighting will be screened, but still would be evident at night. The presence of operational activities, structures and lighting would be limited to the life of the project and therefore would not alter the long-term visual quality.

2. Some unavoidable long-term modification to the site's visual character would occur as a result of the landform and color changes. The primary landform changes would be a result of ore and overburden removal from the mine pits and deposition at the heap leach piles and overburden pile. The changes would be very evident near to the operations, but would be naturally attenuated by distance and intervening vegetation and/or topography from the most heavily travelled roads in the area. The potential visibility impacts of landform and color changes would be softened during reclamation as a result of grading and revegetation, and by rock staining of upper mine pit walls. Such reclamation of the existing Big Chief Hill clay pit may actually result in an overall positive visual impact. Measures that would be implemented to reduce visual contrasts are considered to be in compliance with the "best practices" objectives of the East Mojave national Scenic Area Management Plan.

7.6 LAND USE

1. Vegetation removed by the project would temporarily reduce livestock forage by about 37 animal unit months (AUMs) in the Lanfair Valley grazing allotment until revegetation recovery is completed. This represents about 0.3 percent of the 12,168 AUMs authorized for use in this grazing allotment.

CHAPTER 8.0
CUMULATIVE IMPACTS

8.0 CUMULATIVE IMPACTS

8.1 INTRODUCTION

1. A cumulative impact is the effect on the environment which results from the incremental impact of a proposed action when combined with the effects of other past, present, and reasonably foreseeable future actions. The significance of a cumulative impact can be greater than that resulting from individual actions, if the effects of more than one action are additive. This chapter concentrates on analyses of reasonably foreseeable future activities in the area because the past and present conditions were considered as part of the existing environment evaluated in Chapters 4.0, Description of the Existing Environment, and 5.0, Potential Environmental Impacts. Evaluations in those chapters also considered the potential for the collective effect by the Proposed Action on the entire range of environmental issues considered.

2. Criteria for evaluating the significance of adverse changes were identified for each of the 12 resource categories analyzed in Chapter 5.0. These criteria, which are based on resource sensitivity, quality, and quantity, are also applicable to potential cumulative impacts. The timing and duration of each activity is also an important consideration for evaluating the potential cumulative effects of activities which occur for only a limited period. In those cases, a cumulative effect may occur only when two or more of the activities are occurring simultaneously.

3. In evaluating potential cumulative impacts, it is recognized that future actions will be subjected to a process of environmental review by responsible agencies comparable to that for the Castle Mountain Project, and that similar types of mitigation measures and regulatory standards would be required of those future actions. Moreover, it is assumed that if, in the future, the number of new proposed activities were to increase to levels which collectively would cause unacceptable effects, the appropriate agencies would modify their standards and/or policies to reduce the magnitude of effects from such activities.

4. Study areas considered in assessing cumulative impacts to the various resource categories are:

   - Lanfair Valley and portions of Ivanpah and Piute Valleys in the vicinity of the proposed access routes and crucial tortoise habitat are considered with respect to the resource categories of water, vegetation, wildlife, air quality and land use.

- The northeastern portion of the East Mojave National Scenic Area (EMNSA) is considered for evaluation of visual resources.

5. Effects of the Castle Mountain Project were evaluated in Chapter 5.0, for each issue of concern identified through the BLM public scoping process and the County Initial Study, including geology, water resources, vegetation, wildlife, air quality, health and safety, visual resources, cultural resources, land use, socioeconomics, and infrastructure. Of these resource categories, water, vegetation, wildlife, air quality, visual resources, and land use are appropriate for consideration of cumulative impacts. Other topics, including geology, health and safety, cultural resources, socioeconomics, and infrastructure would not result in unavoidable effects that could be cumulatively significant and are not further evaluated in this chapter. The potential for geologic impacts is specific to each site and the design constraints for each project and would not be a cumulative issue. The issue of health and safety is not considered cumulatively because the potential effects of the Castle Mountain Project would be primarily restricted to operations onsite and would not have the potential to be cumulative with activities at other sites. Health and safety procedures are also highly regulated by local, state, and federal laws. Cultural resources would not be an issue of cumulative concern because potential effects are specific to each site. Mitigation for potential cultural and historical resources also a requirement of Federal and State law. Although the proposed Castle Mountain Project and other potential activities would generate an incremental increase in employment opportunities, population, and associated need for housing and infrastructure, the limited employment anticipated for future activities would not have the potential to substantially affect the availability of housing and infrastructure requirements in the urbanized Las Vegas and southern Clark County areas.

6. The evaluation of potential cumulative impacts is presented in the following two sections:

   - Section 8.2 identifies other existing or planned activities in the area and the major environmental effects of each which could be additive to those of the proposed project.
   - Section 8.3 provides an analysis of the potential cumulative effects of these activities when considered collectively with the proposed project.

8.2 DESCRIPTION OF OTHER ACTIVITIES

1. The primary purposes of this section are: (1) to identify future activities which may occur in the study area, and (2) to evaluate the extent to which they would cause effects which could be cumulative to those described in Chapter 5.0, for the proposed Castle Mountain Project. The consideration of other future activities include those existing activities and facilities that may be expanded during the life of the proposed Castle Mountain Project.

2. Table 8.2.1, Other Activities in the Area, summarizes important existing activities and projects which are expected to have some potential for being developed within the foreseeable future. The potential future projects on the list have been identified by the following agencies:

   - San Bernardino County Planning Department (California)
   - Clark County Planning Department (Nevada)
   - BLM, Needles Resource Area (for Federal land in California)
   - BLM, Stateline Resource Area (for Federal land in Nevada)

3. The anticipated major environmental effects of other activities that could induce a cumulative impact with the proposed project are also identified in this table. The known or expected locations of these activities are shown in Figure 8.2.1, Locations of Other Activities in the Area. The following sections provide expanded descriptions of existing and future activities in the study area.

8.2.1 UTILITIES, SERVICES AND TRANSPORTATION

1. Potential activities that involve upgrading or extension of power, waste disposal, and transportation services are primarily located in Ivanpah Valley. The largest project would be a proposed Los Angeles-to-Las Vegas bullet train. Regulatory approvals for the bullet train have not been formally applied for, and its construction and location are considered speculative at this time.

2. It is expected that effects of these activities would primarily be localized surface disturbance and that issues of concern would be wildlife and visual resources. Except for the bullet train, these activities do not appear to have the potential to affect either the Ivanpah Access Route that would be used for the proposed Castle Mountain Project or the high density portion of the

TABLE 8.2.1

OTHER ACTIVITIES IN THE AREA

DESCRIPTION (responsible agency)[1]	STATUS[2]	ANTICIPATED ENVIRONMENTAL ISSUES WHICH COULD BE CUMULATIVE[3]	PRIMARY IMPACT LOCATION[4]
UTILITIES/SERVICES			
1. AT&T Communications cable upgrading (BLMN)	E/P	4,9	LV
2. PacBell microwave sites (BLMN)	E/P	4,9	LV
3. Bio Gen power plant (SBC)	E	2	IV
4. Additional utility lines (I-15 corridor) (BLMN)	P	4,9	IV
5. Whiskey Pete's airstrip/waterline (BLMN)	P	4	IV
6. Solid waste landfill (UP Tracks near state line) (BLMN)	P	4,12	IV
7. Waste water ponds (Ivanpah Lake) (BLMN)	E	4,9	IV
8. Nipton waste site (BLMN)	P	4,9	IV
9. LA-Las Vegas bullet train (BLMN)	P	4,9,10	IV
COMMERCIAL/RESIDENTIAL			
10. Nipton land exchange (BLMN)	P	4,6,12	IV
11. Scattered residential units (BLMN)	E/P	--	LV
RECREATION			
12. Ivanpah Lake landsailing (BLMN)	E	4,5,10	IV
13. Barstow to Vegas ORV race (BLMN)	E	4,5,10	IV
14. East Mojave Heritage Trail use (BLMN)	E	4,5,10	IV, LV, PV
15. Mojave Road use (BLMN)	E	4,5,10	IV, LV, PV
16. Clark County Road A68P use (BLMS, CC)	E	4,5,10	PV
MINING			
17. Proposed Action/Alternative - precious metals (BLMN)	P	3,4,5,8,9	LV
18. Colosseum Mine - precious metals (BLMN)	E	3,4,5,8,9	IV
19. Caltrans borrow pits - aggregates (BLMN)	E	4,5	IV
20. Morning Star Mine - precious metals (BLMN)	E	3,4,5,8,9	IV
21. Vanderbilt - precious metals mill site (BLMN)	E	3,4,5,8,9	IV
22. Golden Quail Mine - precious metals (BLMN)	E	3,4,5,8,9	LV
23. Hart District Clay Pits (BLMN)	E	4,9	LV
24. Mountain Pass Mine - rare earth materials (BLMN)	E	3,4,5,8,9	IV
25. Exploratory activities (BLMN, BLMS)[5]	E/P	4,5,9	LV, PV
GRAZING			
26. Grazing leases (BLMN, BLMS)[6]	E	4,5	IV, LV, PV

(1) Source of Information

BLMN - BLM, Needles
BLMS - BLM, Stateline
SBC - San Bernardino County, Planning Department
CC - Clark County, Planning Department

(2) Status

E - Existing
P - Proposed

(3) Issues

1 Earth
2 Air
3 Water
4 Wildlife
5 Vegetation
6 Transportation
7 Public Services/ Utilities
8 Health/Safety
9 Visual Resources
10 Recreation
11 Cultural Resources
12 Land Use

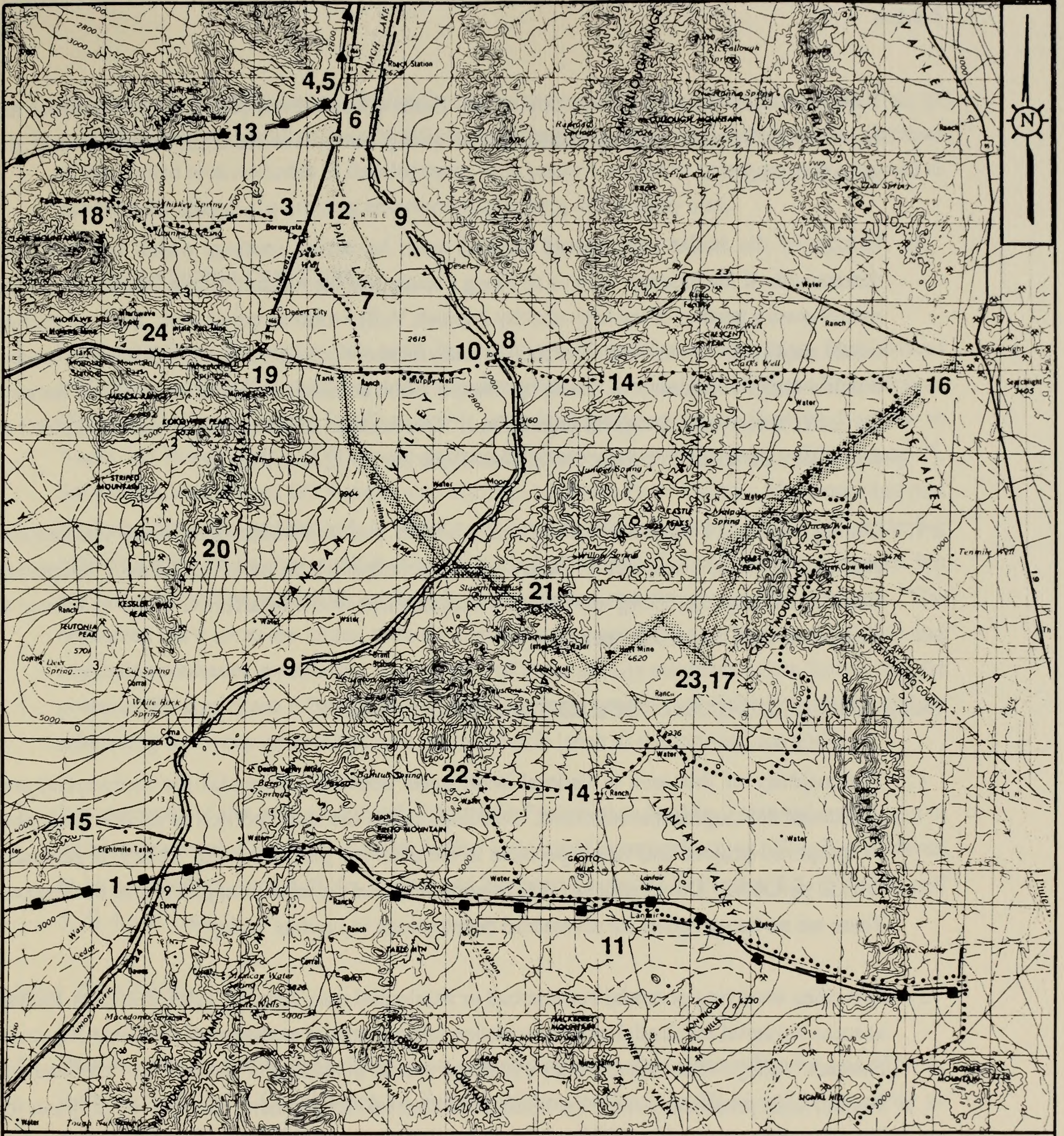
(4) Location

PV - Piute Valley
IV - Ivanpah Valley
LV - Lanfair Valley

See Figure 8.2.1 for approximate locations.

(5) See Figure 8.2.2 for mining exploration activities.

(6) See Figure 4.10.3 for BLM grazing allotments.



LEGEND

23	ACTIVITY LOCATION (FOR DESCRIPTION, SEE TABLE 8.2.1)
░░░░	PROJECT ACCESS ROUTES
··············	EAST MOJAVE HERITAGE TRAIL
—·—·—	MOJAVE ROAD NATIONAL RECREATION TRAIL
—▲—▲—	BARSTOW-TO-VEGAS RACE
- - - - -	CLARK COUNTY ROAD A68P
— — — —	L.A. - LAS VEGAS BULLET TRAIN (ASSUMED LOCATION)
—■—■—	AT&T COMMUNICATIONS CABLE

0 6 12 MILES

SCALE

NOTE: FOR SOME ACTIVITIES, LOCATIONS HAVE NOT YET BEEN SPECIFIED. ALL INDICATED LOCATIONS SHOULD BE CONSIDERED APPROXIMATE.

FIGURE 8.2.1

LOCATIONS OF OTHER ACTIVITIES IN THE AREA

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

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Ivanpah Valley desert tortoise population. From a visual perspective, future facilities are expected to be near existing facilities and would not be visible from locations near the proposed project.

3. Effects of the bullet train would depend upon its actual routing, which has not been determined. If the location were to be along a route near the existing Union Pacific railroad, it would cross a portion of the high density Ivanpah Valley tortoise population. Such an activity would require an extensive environmental analysis and would include appropriate tortoise and wildlife mitigation measures. Existing transportation corridors would not be affected because the bullet train would use grade separation at all crossings. If developed, a beneficial effect of the bullet train could be a reduction in automobile traffic on Interstate 15.

4. The upgrading of buried communication cables and additional microwave transmitters proposed in southern Lanfair Valley would be expected to have only minor temporary construction impacts. Long-term visual conditions that would be affected would be limited to viewpoints near transmitter locations.

8.2.2 COMMERCIAL AND RESIDENTIAL DEVELOPMENT

1. The majority of this area is Federal land, upon which the potential for commercial and residential development is restricted. Development of the small portion of private lands near the proposed project, and larger portions in the southern part of Lanfair Valley, is generally limited by County Development Code requirements for the minimum parcel size of 40 acres. There are no known plans for substantial development in Lanfair Valley.

2. Activities involving potential commercial or residential uses noted in Table 8.2.1, are limited to some scattered residential unit construction and a potential exchange of land near Nipton in Ivanpah Valley. The Nipton land exchange would consist of a trade of private land for Federal land, presumably for some limited commercial development. No specific proposal for such a land trade has yet been filed. Considering the overall sparse population in the area, it is not expected that this exchange would include a major development that could noticeably affect population or transportation conditions in the area.

3. Construction of additional single family residences would result in the incremental loss of wildlife habitat and in other general effects associated with residential development. Because of the limited area available to development, such impacts would be minor and not expected to substantially change the existing environmental setting of the study area.

8.2.3 RECREATION ACTIVITIES

1. Public lands in the region are used for a variety of recreation activities, from casual widespread use such as camping and exploring along dirt roads (including the East Mojave Heritage Trail and Mojave Road) to active organized racing events such as the Barstow to Vegas Off Road Vehicle (ORV) race passing through Ivanpah Valley west of Interstate 15. Smaller club-organized ORV races also occur in northern Piute Valley. Most camping and exploring activities are limited, or occur only occasionally. Casual camping and exploring activities individually may result in minor disturbance to vegetation and wildlife resources, but are not expected to be significant based on the present and foreseeable level of use. The organized ORV races are larger, with the corresponding potential to affect more wildlife and vegetation resources at one time. The number of these activity occurrences are limited and the potential for significant effects is reduced by locational controls established by BLM and by scheduling the events to avoid periods when animals (such as the tortoise) are active.

2. Development of the proposed Castle Mountain Project may lead to increased camping and other recreational activities in Lanfair Valley because of improved access. This is considered to be a secondary impact of the project and has been discussed in Section 5.5, Wildlife, and 5.10, Land Use.

8.2.4 GRAZING

1. Existing grazing activities in the area have been discussed and evaluated under Land Use in Sections 4.10 and 5.10. Grazing on Federal land is regulated by BLM and is generally an agricultural use that affects water, vegetation, and wildlife. No new grazing activities are known to be proposed.

8.2.5 MINING

8.2.5.1 Existing Mining Operations

1. The proposed Castle Mountain Project is the only new mine proposed in the area. The several existing operating mines in the region indicated in Table 8.2.1 are discussed in the following paragraphs in relation to their location and potential cumulative effects with the proposed project.

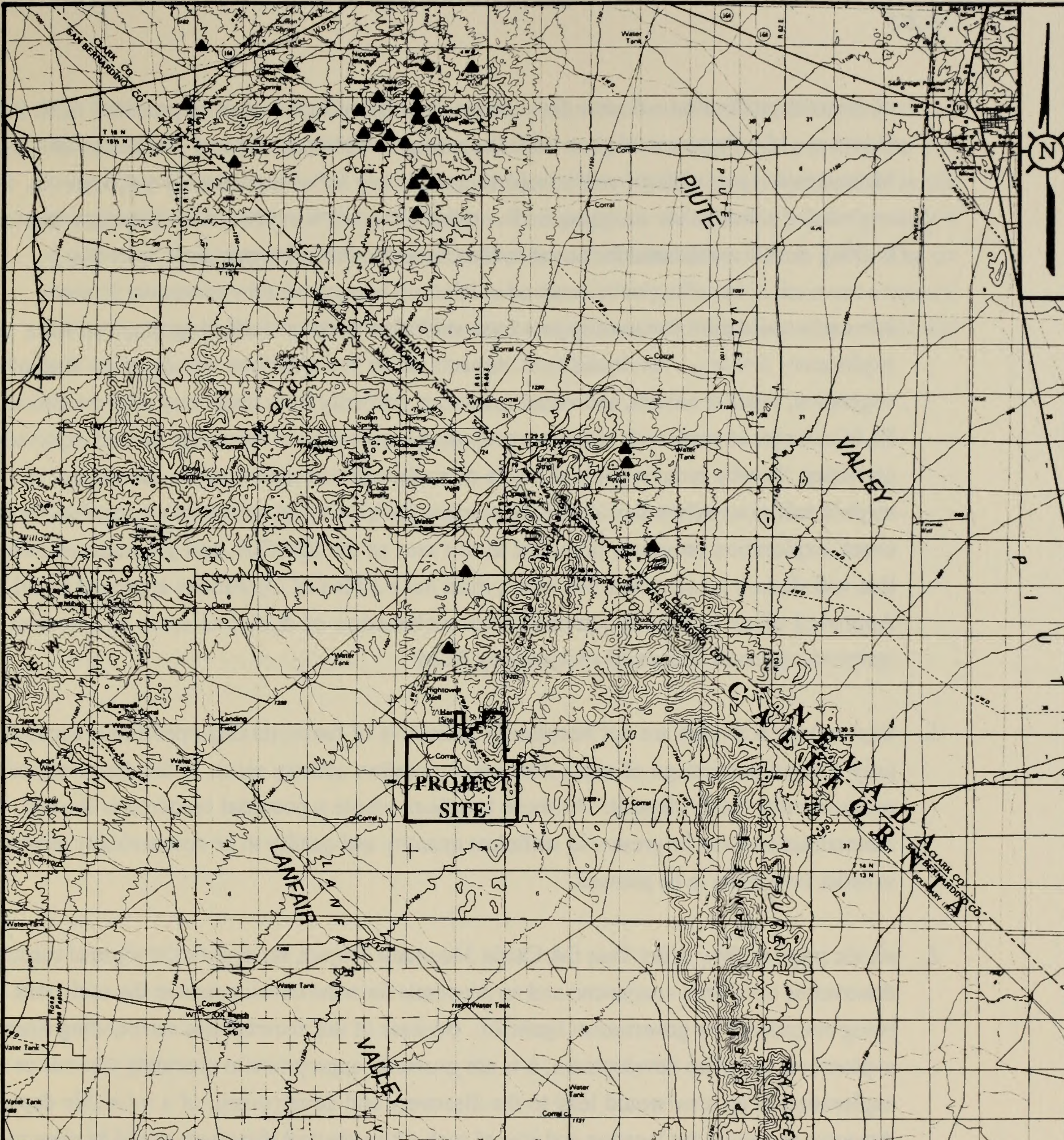
2. The Mountain Pass rare earth mine and Colosseum gold mine are both located north of Interstate 15 in the Clark Mountain Range above Ivanpah Valley. The Mountain Pass mine includes water supply wells adjacent to Nipton Road, just east of Interstate 15, and waste water disposal ponds in the dry Ivanpah Lake bed. These mines are physically separated from Lanfair Valley, but project traffic and activities in Ivanpah Valley would contribute to the effects on the high density desert tortoise population.

3. The Morning Star gold mine is located in the Ivanpah Mountains and is also separated from conditions in Lanfair Valley. However, about three miles of the principal access to this existing mine are along the northern portion of Ivanpah Road and about ten miles of the remainder of that access route are through medium and high density portions of the Ivanpah Valley desert tortoise population.

4. The Vanderbilt mill, located north of Barnwell near the proposed Ivanpah Access Route, and one of the two clay pits near the proposed Castle Mountain Project site are currently inactive. There is no indication that these sites would be actively used in the near future. The most important environmental consideration regarding these sites is the existing visual impact of the clay pits at Hart. The cumulative visual effect of the pits and the proposed project is addressed in detail in Section 5.8, Visual Resources.

8.2.5.2 Mining Exploration

1. Mineral resources exploration is an ongoing activity at a number of areas in the eastern Mojave Desert. About 30 different exploration activities in the study area are currently on file with BLM as shown in Figure 8.2.2, Exploratory Drilling Activities. These activities are mostly occurring at the northern limits of the New York Mountains (Crescent Peak area) in Nevada, outside the EMNSA. The Crescent Peak area has historically been a mining area with periods



LEGEND

▲ EXPLORATORY DRILLING LOCATION

CONTOUR INTERVAL: 50 METERS

SOURCE: BLM, NEEDLES RESOURCE AREA
BLM, STATE LINE RESOURCE AREA
(DATA THROUGH SEPTEMBER 1988)

BASE REFERENCE: U.S.G.S. 30 x 60-MINUTE SERIES TOPOGRAPHIC MAPS OF IVANPAH, CALIFORNIA, AND DAVIS DAM, NEVADA, BOTH DATED 1985

FIGURE 8.2.2

EXPLORATORY DRILLING ACTIVITIES

CASTLE MOUNTAIN PROJECT

ENVIRONMENTAL SOLUTIONS, INC.

of mineral production. Access for mining exploration in this area is provided from State Highway 164 (between Nipton and Searchlight) which is beyond the limits of Castle Mountain Project effects and would therefore not be of cumulative concern. A few exploration activities are occurring in the northern Castle Mountains. Access to these locations is along similar routes used for access to the Castle Mountain Project site.

2. Mineral exploration commonly involves activities such as collecting hand samples and exploratory drilling. Environmental impacts occur from surface disturbances that affect vegetation, wildlife habitat, and visual resources, primarily from temporary road construction. BLM attempts to work with claimants proposing exploration to encourage phased exploration activities, thereby reducing initial levels of surface disturbance until an assessment can be made if sufficient mineralization has been encountered to merit additional exploration. In any event, exploration programs proposed in this area of the EMNSA, and programs elsewhere that will disturb greater than five acres, must have a Plan of Operations approved by BLM. Approved plans include requirements for reclamation of disturbed areas and posting of reclamation bonds, if deemed necessary by BLM.

3. Exploratory activities are not necessarily indicative of future mining operations, because in only a small percentage of cases does an exploration activity result in the discovery of an economically viable deposit. At those locations where a potential resource is located, the mineralization must be present in sufficient quantity and quality to be economically produced in order for a mine to be planned.

4. At the present time, other than the Castle Mountain Project, no significant mineral resource discoveries have been announced and no proposals for mine development in the study area are being considered by government agencies. Because of the uncertainties surrounding mineral exploration and mine development, it is not generally appropriate to speculate whether or not exploration in an area would lead to the discovery and development of a mineable deposit. Attempts to predict the location and size of such a hypothetical discovery would be even more conjectural and would generally provide no useful information for the decision makers. However, to be conservative, this environmental analysis assumes that an economic mineral discovery could be made and that this hypothetical mine could occur in either the Castle Mountain or Crescent Peak area. The area that would be affected is assumed to be comparable to that of the proposed Castle Mountain Project, although operations could be smaller with reduced potential for cumulative effects.

5. If in the future an economically viable discovery were to be made in either of these areas, the additional time typically required to complete detailed exploration, engineering evaluations and environmental assessments that must be undertaken before development could proceed would be expected to be about five to ten years. This suggests that production from such a hypothetical discovery is unlikely to occur until at least the period from 1995 to 2000. The six resource categories with the greatest potential to be cumulatively affected in the event a mineral discovery were to be developed would be water, vegetation, wildlife, air quality, visual and land use.

8.3 EVALUATION OF POTENTIAL CUMULATIVE IMPACTS

1. This section evaluates the cumulative impact on the environment resulting from the proposed Castle Mountain Project, continuing activities at existing facilities, and foreseeable future activities. For the reasons discussed in Section 8.1, resource categories that would not have a potential for a cumulative effect, including geology, health and safety, cultural resources, socioeconomics, and infrastructure, are not further evaluated.

2. As discussed in Section 8.1, resources for which an unavoidable impact could occur from the Castle Mountain Project that could potentially combine with the effects of other activities to produce a significant cumulative impact are analyzed, including water, vegetation, wildlife, air quality, visual resources, and land use. The Castle Mountain Project is located in a region where development is limited and generally restricted by environmental constraints, land ownership characteristics, County Development Code requirements, and Federal land use policies. Most land in the area is managed by BLM for multiple uses that include mining, livestock grazing, transportation and utilities, outdoor recreation, and wildlife, as stipulated in the Federal Land Policy Management Act. Because other activities within the potential cumulative impact area are generally isolated from each other and from the proposed Castle Mountain Project either by distance or intervening topography, the potential for a cumulative impact on most of these resource categories is minimal. Based upon these considerations, and upon the mitigation measures that would be applied to the proposed project and future projects to cover the range of impacts anticipated, the effects of other existing and reasonably foreseeable activities and the proposed action would not significantly affect an environmental resource or the continuation of existing land use. This determination is developed for each of these six resource categories according to the following format:

   - Unavoidable Project Impact: Impacts described in Chapter 7.0, Unavoidable Impacts, that could be added to the effects of other activities.
   - Other Activities Impacts: Potential effects of other activities (see Table 8.2.1).
   - Cumulative Impacts: The potential collective effect of the proposed Castle Mountain Project, plus other activities.

8.3.1 WATER

1. Unavoidable Project Impact: The Castle Mountain Project would use water at the rate of about 450 gpm (725 acre-feet annually) for the approximate 10-year life of the project. The impact analysis completed for this water use demonstrated that the drawdown effects would be

limited to the northern Lanfair Valley and would not restrict other existing uses or affect flows at Piute Spring. The withdrawal would be moderated by aquifer recharge so that the aquifer deficit at project completion would essentially recover to pre-project conditions within about 10 years after the mining and processing is discontinued.

2. Other Activities Impacts: Existing cumulative withdrawals due to other ongoing activities in Lanfair Valley was estimated and collectively evaluated with the Castle Mountain Project in Chapter 5.3, Water Resources. No new uses are proposed that would substantially alter this use rate. Based upon the current locations of mining exploration activities (see Figure 8.2.2), it is expected that, if another mine were developed in the Crescent Peak area, it would use a different source for its water - presumably northwestern Piute Valley or northeastern Ivanpah Valley. If an additional mine were to be located such that the Lanfair Valley aquifer could be a viable water source, an extensive investigation would be required by that project to determine the degree to which such a withdrawal might adversely affect other users and Piute Spring.

3. Cumulative Impacts: There are no reasonably foreseeable activities that would add substantially to the existing water resource impacts in Lanfair Valley. If a new mine were to be developed, an investigation for potential water resource impacts would be undertaken. If a potentially significant adverse effect were identified, water would most likely have to be obtained from another source. The potential for a cumulative adverse effect would thereby be avoided.

8.3.2 VEGETATION

1. Unavoidable Project Impact: About 920 acres of vegetation would be disturbed in the blackbush scrub, Joshua tree woodland and creosote bush scrub communities, and in the Lanfair Valley grassland UPA. This represents about 0.2 percent of this type of vegetation in Lanfair Valley. Reclamation would be implemented, but vegetation recovery may require a substantial period after completion of operations.

2. Other Activities Impacts: The majority of the existing activities shown in Table 8.2.1 would not be expected to result in large new disturbances to vegetation. Increased recreation in Lanfair Valley may cause minor disturbances, but not over large widespread areas. Development of residential units would result in the long-term loss of vegetation. This would occur on private lands primarily located in the western and central portions of the valley. The degree of disturbance for potential new projects would be related to the amount of area

disturbed, duration of continued disturbance, and local revegetation processes. The greatest potential for area disturbed would be from the hypothetical mine located in the Crescent Peak area of Nevada or northern Castle Mountains. The majority of such disturbance would likely occur following initiation of reclamation for the proposed project.

3. Cumulative Impacts: There are no reasonably foreseeable activities which could substantially add to vegetation impacts of the proposed project in Lanfair Valley. If a new mine were to be postulated as occurring in the Crescent Peak area the related vegetation disturbance would not have a direct relationship to that of the proposed project, although it would likely affect one or more of the same plant communities. Development of another deposit in the Castle Mountains could have a more localized additive effect with the proposed project, but the cumulative effects would be minor because all or most of the activities are expected to occur in a different time sequence.

8.3.3 WILDLIFE

1. Unavoidable Project Impact: The project would reduce the quality of onsite habitat through vegetation removal and soil disturbance. Although the site contains no unique or crucial habitat, wildlife inventories have indicated that portions of the area are used by three species of special concern: bighorn sheep, desert tortoise, and Bendire's thrasher, and possibly by bats. The site is not considered to be crucial habitat to any of these species, but access roads to be used do pass through crucial tortoise habitat in Ivanpah and Piute Valleys. Potential traffic impacts to the tortoise along these roads would be mitigated through the construction of tortoise-proof fences so that no overall detrimental impact to the tortoise would occur.

2. Other Activities Impacts: The majority of the existing activities shown in Table 8.2.1 would not be expected to result in large, new impacts to wildlife. These future activities are not generally extensive in area or collectively located such that a substantial effect on wildlife would be expected. The future bullet train could be an exception, depending on its final route, but it is reasonable to expect that such a project would include extensive environmental impact analysis and mitigation measures. Also, if a new mine near Crescent Peak or development of a deposit in the Castle Mountains were to occur, it would be expected to effect wildlife habitat to some degree, and affect tortoise populations along roads used.

3. It is unlikely that either the bullet train or a new mine would be under construction or operational for at least five years. A similar time frame would apply to development of a new

deposit in the Castle Mountains. Therefore, their period of overlap with the operational period of the proposed project would be limited to a few years. Based on current BLM practices, if such projects were determined to potentially affect areas of crucial habitat, their proponents would be required to provide mitigation measures to avoid the potential for adverse impacts to wildlife.

4. Cumulative Impacts: The existing and reasonably foreseeable activities in this region, including the Castle Mountain Project, would not cumulatively cause a significant impact on most wildlife species. A possible exception may be the desert tortoise. All identified activities within tortoise habitat, including road traffic from each source, utility construction, recreation uses and mining, could reduce available habitat and decrease the tortoise population unless those actions are properly mitigated. Mitigation must address potential indirect impacts such as raven predation, as well as the obvious direct impacts. With implementation of effective mitigation measures on this and all future projects, the net effect on the desert tortoise population in crucial habitat areas may be cumulatively positive, especially in the long run.

8.3.4 AIR QUALITY

1. Unavoidable Project Impact: The project would contribute to a short-term incremental impact on air quality during the operational period. Emissions would be maintained within standards applied by the San Bernardino County Air Pollution Control District.

2. Other Activities Impacts: None of the existing or known future activities would be expected to create emissions which would contribute noticeably to those from the proposed Castle Mountain Project. If a hypothetical new deposit were to be located in the Castle Mountains, it could produce emissions comparable to those from the proposed project. However, as is the case for the Castle Mountain Project, a hypothetical new mine would be required to control its emissions such that it would be in compliance with National and State Ambient Air Quality Standards, such that no significant cumulative impact would occur.

3. Cumulative Impacts: There are no widespread activities within the study area which could reasonably be expected to substantially add to emissions from the proposed Castle Mountain Project.

8.3.5 VISUAL RESOURCES

1. Unavoidable Project Impact: A short-term impact due to visibility of structures and activities would occur during the operation period. Long-term landform alterations and some color contrasts would be mitigated using best practices, but would remain visible from selected viewpoints in Lanfair Valley. The visual analyses discussed in Section 5.8, Visual Resources, indicate that reclamation of the Big Chief Hill clay pit by the Castle Mountain Project Applicant would result in a substantial improvement to the visual quality of the southern Castle Mountains.

2. Other Activities Impacts: None of the existing or known possible future projects which might have the potential to cause a significant visual impact is located in an area where it could be viewed at the same time as the proposed Castle Mountain Project. An exception could occur if a new mine were to be located near the southern or southwestern exposures of the Castle Mountains where it could be viewed simultaneously with the proposed project. It is expected that topography would obstruct simultaneous viewing of the proposed project and a potential future mine located in the northern Castle Mountains. A new mine near Crescent Peak would be a considerable distance from the proposed project, and screened from the proposed project area by topography.

3. Based on the EMNSA Plan (BLM 1988), it is assumed that future discretionary actions in the EMNSA, including extensions to existing discretionary projects, would be required to satisfy the Class II visual resource management objective. Nondiscretionary activities would be required to satisfy "best practices." On this basis, the largest potential for an adverse visual change which could have a cumulative effect with the proposed project would be the hypothetical mine, if it were to be developed in the Castle Mountains. Such a project would have to be mitigated for visual contrasts in a manner similar to that required of the proposed project through reclamation and revegetation procedures.

4. Cumulative Impacts: The greatest potential for a cumulative visual impact would occur with the development of an additional mine in the Castle Mountains. Since no development proposed for such a mine is presently under consideration for approval by the responsible agencies, the visual effects that could occur can not reasonably be foreseen. If such a deposit were to be developed, however, the mining activities would be required to satisfy the EMNSA objective of best practices for nondiscretionary projects. Because of the configuration of the Castle Mountains, an additional mine would not necessarily be seen simultaneously with the

proposed project from most viewpoints in Lanfair Valley, unless it were on the southern or southwestern exposure of the mountains. The cumulative visual impact of mining activities may not, therefore, be additive from a single viewpoint, but could still be considered to be additive in the context of the northeastern portion of the EMNSA.

5. It is expected that in general, the overall existing visual character of the project site would be positively affected by reclamation of the Big Chief Hill clay pit. Although the proposed project would create new disturbances, for mid-range to distant viewpoints in Lanfair Valley the overall visual impact of the reclaimed clay pit and reclaimed Castle Mountain Project would cumulatively represent an improvement with respect to existing conditions.

8.3.6 LAND USE

1. Unavoidable Project Impact: Vegetation removal would result in a limited reduction in livestock forage (AUMs) in the Lanfair Valley and Crescent Peak allotments until recovery is complete.

2. Other Activities Impacts: Ongoing grazing activities are the primary impact on forage in these allotments. This impact is monitored by BLM. The limited areal impact of other activities including residential development, utility construction, and other mining activities have a measurable but not substantial effect on forage in the region's grazing allotments.

3. Cumulative Impacts: The limited reasonably foreseeable activities in the study area would not substantially add to the impacts to grazing on these grazing allotments.

CHAPTER 9.0
OTHER REQUIRED CONSIDERATIONS

9.0 OTHER REQUIRED CONSIDERATIONS

1. This chapter focuses on several specific impacts of the proposed action in a format required by the National Environmental Protection Act and California Environmental Quality Act. These issues are:

   - Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-Term Productivity
   - Irreversible and Irretrievable Commitments of Resources
   - Growth-Inducing Effects of the Proposed Action
   - Energy Consumption and Conservation

   The information presented is based upon more detailed discussions in Chapters 5.0, Potential Environmental Impacts, 7.0, Unavoidable Adverse Impacts, and 8.0, Cumulative Impacts.

9.1 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

1. Principal uses of the project site as established by previous activities and as provided by the Federal Land Policy Management Act include livestock grazing, wildlife, mineral exploration and production, and outdoor recreation. The proposed action would commit approximately 890 acres of the 2,735-acre site to a single land use for an approximate 10-year operation period. The remainder of the site would not be fenced and would continue to be available for grazing and wildlife habitat. Recreation opportunities would be enhanced by construction of a viewing site and an information center to explain current operations and the mining history of the Hart Mining District to visitors to the area.

2. Following the operation period, the majority of the site would be reclaimed so that the existing uses would be reestablished. The length of time for reclamation may require several decades. The mine pits, covering approximately 135 acres, would not be reclaimed and would not be available to grazing, recreation or wildlife land uses. The mine pits would, however, remain accessible for potential future mineral production. Reclamation procedures at the pits would include provisions to minimize the potential risks to health and safety.

3. The Applicant believes that the project action is justified at this time because of the economic and social benefits. Project employment, direct and indirect expenditures, and property tax would contribute to the economic health of the region. Development of mineral resources is in the national interest to assure satisfaction of industrial and security needs. In providing these benefits, the project would not preclude the long-term use of the site for other principal uses.

9.2 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

1. Extraction of the ore would gradually diminish the value of the Castle Mountain orebody until it could no longer be economically mined at current gold prices. This would represent an irreversible development of known gold reserves. However, extraction and processing of gold would not diminish its usefulness, but would instead make the resource available for use by society.

2. The irretrievable commitment of resources during construction and operation would involve the use of energy and materials. Energy would be expended in the form of diesel fuel, propane, and natural gas for power production, and diesel fuel, gasoline, and oil for mining equipment and transportation vehicles. Materials used for construction would include limited amounts of wood, aggregate, plastics, steel, aluminum, and other metals. The major commitments of materials during operations would include processing reagents, explosives, cement and lime for agglomeration, and tires for equipment. At project completion, major processing facilities and structures, and equipment would be removed from the site for potential use at other locations.

3. The proposed project would irreversibly change the visual character of the site. Mitigation measures would reduce long-term visual contrasts of the area, but nearby viewers would notice contrasts in color and landform of project features relative to the surrounding environment. These changes would be in conformance with the existing Class III character of the project area and in compliance with "best practices" objectives of the East Mojave National Scenic Area Plan.

4. As discussed in Section 9.1, reclamation procedures would be designed to provide for reestablishment of primary land uses, including outdoor recreation, livestock grading, and wildlife habitat. The Searchlight Access Route would also be reclaimed to return access to the northern Castle Mountains area to that provided by existing trails. An irreversible change to patterns of movement would therefore not occur.

5. Design parameters for the Castle Mountain Project would include provisions to reduce the potential for environmental accidents. Structures would be designed to withstand the effects of ground shaking as required by the Uniform Building Code and other applicable local seismic codes and ordinances. Rules and regulations set forth by BLM, Regional Water

Quality Control Board, Colorado River Basin, and the San Bernardino County Department of Environmental Health Services would be followed to ensure no significant impact to environmental health and safety would occur.

9.3 GROWTH-INDUCING EFFECTS OF THE PROPOSED ACTION

1. The proposed action would be self-supporting for utilities and services. Although wells would be developed and a natural gas pipeline would be extended to the site, these facilities would not be made available for residential uses. No other utilities or services would be extended that could be used by other development. Based on the general absence of public utilities and services, and upon BLM and County Development Code land use policies, it is not anticipated that the project could indirectly induce population growth into the area through the provision of utilities.

2. It is expected that the growth-inducing effects of the Castle Mountain Project would be limited to the housing demand for employees, and secondary economic growth from expenditures by the project and its employees. The Castle Mountain Project would provide employment for about 150 to 200 persons for the life of the mine. There are extensive areas of private land in southern Lanfair Valley. It is possible that private residences could be developed on some of these properties by mine employees, although such local development has not been experienced at similar operations. It has been determined that existing and planned residential areas in the Las Vegas valley and in communities along U.S. Highway 95 are adequate to meet the need for employee housing. Expenditures made by project employees would create some secondary (indirect) employment in the retail trade and services industries, but is expected that these positions would be accommodated by the existing labor market of the region. On a "worst case" basis, if all project employees and their families and indirectly employed persons and their families were to move to the area, the total population growth would be less than 0.2 percent of the projected growth in Clark County between the years 1990 and 2000.

9.4 ENERGY CONSUMPTION AND CONSERVATION

1. Construction and operation of the proposed Castle Mountain Project would result in consumption of non-renewable energy resources. These resources would primarily include petroleum products such as diesel fuel and gasoline, propane and natural gas. Operation of heavy equipment and machinery for electric power generation is estimated to require about

260,000 gallons of diesel fuel per month and 250,000 gallons of propane or 250,000 gallons of natural gas each month. Consumption of gasoline which would be used for personnel vehicles is estimated at about 10,000 gallons/month.

2. Fuel consumption of heavy mining equipment would be the largest single energy requirement. Therefore, one of the primary opportunities for energy conservation would be regular maintenance of vehicles and equipment to maximize fuel efficiency. The proposed Castle Mountain Project has been designed for operational efficiency, including measures such as minimizing haul road travel distances to reduce fuel consumption. Providing bus/van pool services to project employees would also reduce gasoline consumption.

CHAPTER 10.0
TERMS AND ABBREVIATIONS

10.0 TERMS AND ABBREVIATIONS

10.1 DEFINITION OF TERMS

The definitions below are provided as clarification for terms as used in this document.

TERM	DEFINITION
Acre-foot	The amount of water (325,851 gallons) that will cover one acre at a depth of one foot.
ADT	Average daily traffic. Measured as a one-way trip (a round trip is two one-way trips).
Alluvium	A general term for deposits made by streams on river beds, flood plains, and alluvial fans. The term applies to stream deposits of recent time.
Agglomeration	The process by which fine particles of crushed rock are bound to larger pieces of crushed rock so leach solutions may descend readily through layers of the crushed, compacted material, thereby extracting gold.
Ancillary facilities	Secondary support structure and equipment.
ANFO	A slurry of ammonium nitrate and fuel oil, used as an explosive for blasting purposes.
Animal Unit Month (AUM)	The amount of forage necessary for the sustenance of one cow or its equivalent for one month.
Aquifer	A body of rock that is sufficiently permeable to conduct ground water and to yield economically significant quantities of water to wells and springs.
Barren solution	Non gold-bearing sodium or calcium cyanide solution.
Basement rock	The undifferentiated rocks (commonly igneous or metamorphic) that underlie the rocks of interest (commonly sedimentary) in a given area.
Bedrock	The rock that underlies gravel, soil, or other superficial material.
Berm	An earthen structure, generally several feet high, which acts as a barrier to make it difficult for a vehicle to cross, or which redirects the flow of traffic or water.

TERM	DEFINITION
Breccia	Rock consisting of fragments, more or less angular, in a matrix of finer grained material or of cementing material. May form by faulting or crushing (tectonic breccia), by erosion (clastic breccia), by collapse, by replacement bordering fractures, or by volcanism, e.g., *volcanic breccia.*
Bypass surge pile	A facility to temporarily store crushed ore in the conveying circuit between the crushing plant and the leach pads. The purpose of the surge pile is to provide operational flexibility, enabling the flow of material from the crushing plant to be diverted to the bypass surge pile, such as when the stacking conveyer system is shut down while being relocated on the pile.
Carbon column	The container in which the carbon adsorption process takes place. Typically the column will be a cylindrical vessel five to six feet in diameter and up to 15 feet high. The vessel is filled with activated carbon. The gold-bearing solution is introduced at the bottom of the vessel, and the barren solution exits at the top of the vessel.
Carbon reactivation	A process to restore the capability of carbon to adsorb additional gold. The process involves heating the carbon at temperatures between 850 and 1,000 degrees Fahrenheit.
cfs	Abbreviation for cubic feet per second. One cubic foot per second equals a steady flow of 440 gallons per minute, or approximately 725 acre-feet per year.
Color	The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects.
Cone of depression	The depression produced in a water table or potentiometric surface by pumping.
Confining bed	A low permeability rock or soil formation that will not transmit water readily and which retards or stops the free movement of water underground. Confining beds have also been called aquicludes, aquitards, or semiconfining beds. Few deposits are completely impermeable--most will transmit some water, though slowly, hence "aquifer" and "confining bed" are relative terms.
Contrast	The effect of a striking difference in form, line, color, or texture of a landscape's features.
Crushed ore	The final product from the crushing plant. Ore mined from the open pit can be as large as six feet on each side. This ore is reduced in size in a series of crushers until all of the ore can pass through a screen with a 3/8-inch opening.
Cumulative impacts	Two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects.

TERM	DEFINITION
Discharge	Rate of flow at a given instant in terms of volume per unit of time: pumping discharge equals pumping rate, usually given in gallons per minute; stream discharge, usually given in cubic feet per second. In ground water use: the movement of water out of an aquifer. Discharge may be natural, as from springs, seepage, or evapotranspiration, or it may be artificial, with use of constructed drains or wells.
Drawdown	The lowering of the water table or potentiometric surface caused by pumping (or artesian flow). Knowledge of the amount of drawdown at a given pumping rate, over a specified length of time, is necessary to estimate the probable long-term effect on the water table of pumping from the aquifer.
Drip irrigation	A process of distributing cyanide solution across the top of the leach pile in order that gold may be leached from the ore. The process uses plastic tubing approximately 1/2-inch in diameter. A small opening about every 18 to 36 inches along the length of the tubing allows a small quantity of sodium or calcium cyanide solution to drip out of the tube.
Economic Resource	This term implies that profitable extraction or production under defined investment assumptions has been established, analytically demonstrated, or assumed with reasonable certainty.
Effective velocity	The actual or field velocity of ground water percolating through water-bearing material. It is measured by the volume of ground water passing through a unit cross-sectional area, divided by effective porosity.
Effects	"Effect" and "impact" are synonymous as used in this report. Direct or primary impacts are those caused by the project and occur at the same time and place. Indirect, or secondary, effects are those which result from the project which occur later in time or farther removed in distance or time, but are still reasonably foreseeable.
EIR	Abbreviation for Environmental Impact Report. A detailed statement prepared under The California Environmental Quality Act describing and analyzing the significant environmental effects of a project and discussing ways to mitigate or avoid the effects. The term "EIR" may mean either a Draft or a Final EIR, depending on the context. California Environmental Quality Act uses the term "EIR" in place of the term "EIS" which is used in the National Environmental Policy Act.
EIS	Abbreviation for Environmental Impact Statement. A detailed document prepared pursuant to National Environmental Policy Act.
Endangered species	An animal or plant species which is in danger of extinction throughout all or a significant portion of its range (as defined in the Endangered Species Act Amendments of 1982).

TERM	DEFINITION
Environment	The physical conditions which exist within the area which will be affected by a proposed project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance. The area involved shall be the area in which significant effects would occur either directly or indirectly as a result of the project. The "environment" includes both natural and man-made conditions.
Environmental Impact Statement (EIS)	An analytical document that portrays potential impacts to the human environment of a particular course of action and its possible alternatives. An EIS is developed for use by decision makers to weigh the environmental consequences of a potential decision.
Ephemeral stream	A stream or portion of a stream which flows only in direct response to precipitation. Such flow is usually of short duration. Most of the dry washes of the region of the proposed Castle Mountain Project may be classified as ephemeral streams.
Evapotranspiration	The process by which water is returned to the air through direct evaporation or by transpiration of vegetation, with no attempt being made to distinguish between the two.
Feasible	Capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.
Flow line	As applied to the movement of ground water, the path that a particle of water follows as it moves down the hydraulic gradient.
Form	The mass or shape of an object, which appears unified; often defined by edge, outline, and surrounding space.
g	The acceleration of gravity (32.2 ft/sec^2).
Ground water	Water found beneath the land surface, in the zone of saturation below the water table.
Habitat	The place where an animal or plant normally lives, often characterized by a dominant plant and codominant form, such as pinyon-juniper habitat.
Haul road	A road used by large (50- to 100-ton capacity) trucks to haul ore and overburden from the open pits to other locations.
Head (static)	The height above a standard datum of the surface of a column of water (or other liquid) that can be supported by the static pressure at a given point.

TERM	DEFINITION
Heap	A pile of crushed ore placed in a bed comprised of several layers, each being about 15 to 20 feet thick. The bed is underlain by impermeable material to collect the leach solutions. Care is taken during the placement of the crushed ore in the bed so as to avoid compaction, in order that the leach solutions can flow freely through the ore in order to extract the gold.
Heap lift	After most of the gold has been extracted from the bed of ore, an additional layer of ore may be placed on top of the initial layer in order to continue the leaching. The second layer, or "lift," is also 15 to 20 feet high. Over time, several lifts may be placed one on top of the other.
High-grade	A term to describe ore which contains a higher than usual concentration of gold. The term is a relative one in that it is related to the cost to extract the gold from the ore. Since underground mining costs are generally considerably more expensive than open pit mining costs, the term "high-grade" for an underground mine would generally mean ores containing in excess of 0.25 ounce of gold per ton, whereas for open pit ores the same term would apply to ores generally containing only one-third to one-quarter of this quantity of gold per ton of ore.
Hydraulic gradient	The gradient (slope) of the potentiometeric surface or water table in the direction of the steepest slope, generally expressed in feet per foot or feet per mile. May also be stated as the change in static head per unit of distance in a given direction.
Impermeable	Not capable of transmitting fluids or gasses in appreciable quantities.
Infiltration	Movement of water through the soil surface into the ground. Infiltration takes place above the water table, as distinguished from percolation,which is the more or less horizontal movement of water in saturated material, below the water table.
Initial study	A preliminary analysis prepared by the Lead agency to determine whether an Environmental Impact Report (EIR) or a Negative Declaration must be prepared or to identify the significant environmental effects to be analyzed in an EIR.
Intermediate solution	A water-based leaching fluid bearing a moderate amount of dissolved gold. Such fluid is recirculated to the heaps to leach additional gold in order to increase its gold content for processing. The more enriched solution would be termed "pregnant" solution.
Isotropic	Having physical properties (e.g., strength characteristics) which do not vary with direction.
Isotropy	That condition in which all significant properties are independent of direction.

TERM	DEFINITION
Leaching	A process by which gold is extracted from ore using a dilute solution of sodium or calcium cyanide.
Lead agency	The public agency which has the principal responsibility for carrying out or approving a project.
Lime	A chemical made from limestone that is used for pH control in the leaching process.
Line	The path that the eye follows when perceiving abrupt differences in form, color, or texture. In the landscape, ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as line.
Live storage	Crushed ore is generally placed in a stockpile with an overhead conveyor. As ore falls off the end of the conveyor, a pile is formed, which is conical in shape. Ore is withdrawn from the stockpile using feeder devices located beneath the stockpile. Live storage refers to the ore in that portion of a crushed ore stockpile which will flow by gravity into feeder devices. Typically, the live storage is between one-quarter and one-third of the total storage capacity of the stockpile.
Low-grade ore	Ore resources which cannot be economically processed at this time.
Magazine	A storage room for explosives. Magazines are built to specifications set by the Mine Safety and Health Administration and are usually located in a secure but remote area of the project site.
Mine pit	Area from which ore and overburden are removed.
Mitigation	A method or procedures which may: (1) avoid an impact altogether by not taking a certain action or parts of an action, (2) minimize impacts by limiting the degree or magnitude of the action and its implementation, (3) rectify the impact by repairing, rehabilitating, or restoring the impacted environment, (4) reduce or eliminate the impact over time by preservation and maintenance operations during the life of the action, and (5) compensate for the impact by replacing or providing substitute resources or environments.
Mitigation measure	Method or procedure undertaken for the purpose of avoiding or reducing potential impact(s) of an action.
Ore	Rock containing sufficient quantities of gold so that the gold can be extracted economically.
Ore blending	Ores taken from various sections of the orebody will have different gold content and metallurgical characteristics. These ores are often mixed or "blended" together in order that the material fed to the processing plant has reasonably consistent gold grade and metallurgical characteristics.

TERM	DEFINITION
Overburden	Rock which contains either no gold or gold in quantities that cannot be economically extracted. Because such rock either lies on top of ore or is mixed in with the ore, overburden must be mined in advance of or at the same time as the ore is mined.
Patented claims	Mining claims for which the U.S. government has conveyed the fee simple interest in the surface and minerals into private ownership.
Permeability	A measure of the relative ease with which a porous medium can transmit a liquid under a potential gradient. It is a property of the medium alone and is independent of the nature of the liquid and of the force field causing movement. It is a property of the medium that is dependent upon the shape and size of the pores.
Potentiometric surface	The surface which represents the static head, especially in those aquifers in which water is confined under hydrostatic pressure. As related to an aquifer, it is determined by the levels to which water will rise in tightly cased wells. The water table is a particular potentiometric surface, all points of which are at zero hydrostatic pressure.
Pregnant solution	A gold-bearing, water-based sodium or calcium cyanide fluid which contains sufficient quantities of gold that it can be sent to the processing plant to recover the gold.
Primary leach cycle	The leaching operation in which barren solution is distributed through fresh ore to extract the gold. The resulting solution is known as intermediate solution.
Process facilities	As used in this document, generally means the plant and equipment used to extract gold from the pregnant solution. Occasionally may also refer to the crushing plant.
Project	The whole of an action, which has a potential for resulting in a physical change in the environment.
Protore	Material which does not contain sufficient gold to be economically processed using present technology, but which, given favorable changes to gold price or processing technology, could be economically recoverable in the future. Such material is usually segregated into a stockpile so that they will be readily accessible in the future.
Public land	Any land and interest in land owned by the U.S. within the several states and administered by the Secretary of the Interior through the U.S. Bureau of Land Management, without regard to how the U.S. acquired ownership, except: (1) lands located on the Outer Continental Shelf, and (2) lands held for the benefit of Indians, Aleuts, and Eskimos.
Reactivation kiln	The equipment used in gold processing to heat the carbon to restore its capability to adsorb gold from cyanide solution.

TERM	DEFINITION
Recharge	Process by which water infiltrates and is added to an aquifer, either directly or indirectly by way of another rock formation; also, the water itself.
Reserves	That part of the reserve base which could be economically extracted or produced at the time of determination. The *reserve base* is that part of an identified resource that meets specified minimum physical and chemical criteria related to current mining and production practices, including those for grade, quality, thickness, and depth.
Resource	A concentration of naturally occurring solid, liquid, or gaseous material in or on the Earth's crust in such form and amount that economic extraction of a commodity from the concentration is currently or potentially feasible. *Identified resources* are resources whose location, grade, quality, and quantity are known or estimated from specific geologic evidence.
Run-of-mine	Refers to ore that has been broken by blasting, before it has been crushed and screened.
Saturated zone	Zone in which all the connected interstices or voids in a rock or soil are filled with water under pressure equal to, or greater than, atmospheric pressure. The water table commonly is considered to be at the top of the zone of saturation.
Secondary leach cycle	The leaching operation in which intermediate solution is distributed through ore which has undergone at least one previous stage of leaching, in order to extract additional quantities of gold. Depending on the gold content of the solution produced as a consequence of the secondary leaching, this solution will be diverted either to the intermediate or pregnant solution storage pond.
Significant effect	A substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance.
Sodium or calcium cyanide	A solid chemical reagent which is dissolved in water to form a solution suitable for extracting gold from ore by using a leaching process.

TERM	DEFINITION
Specific yield	The ratio of: (1) the volume of water which the rock or soil, after being saturated, will yield by gravity to (2) the volume of the rock or soil. The definition implies that gravity drainage is complete. In the natural environment, specific yield is generally observed as the change that occurs in the amount of water in storage per unit area of unconfined aquifer as the result of a unit change in head. Such a change in storage is produced by the draining or filling of pore space and is therefore dependent upon particle size, rate of change of the water table, time, and other variables. Hence, specific yield is only an approximate measure of the relation between storage and head in unconfined aquifers. It is equal to porosity minus specific retention.
Static water level	The level at which water stands in a non-pumping well; the pre-pumping level. Also, the level to which water eventually will return after pumping has stopped, sometimes called the recovery level.
Storage coefficient	The storage coefficient is the volume of water an aquifer releases from or takes into storage per unit surface area of the aquifer per unit change in head. In a confined water body, the water derived from storage with decline in head comes from expansion of the water and compression of the aquifer; similarly, water added to storage with a rise in head is accommodated partly by compression of the water and partly by expansion of aquifer. In an unconfined water body, the amount of water derived from or added to the aquifer by these processes generally is negligible compared to that involved in gravity drainage or filling or pores. Hence, in an unconfined water body, the storage coefficient is virtually equal to the specific yield.
Stripping column	The vessel in which gold is removed ("stripped") from the activated carbon. The stripping chemical is a concentrated solution of sodium cyanide and caustic soda. After it has been stripped free of the adsorbed gold, the carbon is sent to the reactivation kiln to regenerate its capacity to adsorb gold.
Subsidence	Sinking or settlement of the land surface, due to any of several processes but frequently from the removal of ground water. As commonly used, the term relates to the vertical downward movement of natural surfaces, although small-scale horizontal displacement also may be present.
Sump	An excavation dug in a storage area to collect spillage or drainage from the storage area. Usually an impermeable material is used to line the sump to keep solution from escaping into the outside environment.
Surfactant	One of a number of chemicals which, when added in minute quantities to water, reduces the surface tension of the water, thereby improving its efficiency as a wetting agent.

TERM	DEFINITION
Texture	The visual manifestation of the interplay of light and shadow created by variations in the surface of an object.
Transmissivity	Ability of a rock to transmit water under hydraulic head. The transmissivity is the rate of flow of water at the prevailing temperature, through a vertical unit-wide strip of the aquifer, extending the full height of saturation, under unit hydraulic gradient (one unit of head per unit of flow distance).
Transpiration	The discharge of water vapor by plants.
Unconfined water	Ground water not under artesian conditions. Generally used to describe water that does not rise above the level at which it is first found, at the time it is found. Seasonal changes in both unconfined and confined water levels may take place as a result of variations in recharge and discharge.
Underflow	Water moving parallel to a stream course through alluvium beneath the streambed.
Unsaturated zone	Zone in which the connected interstices or voids in a permeable rock are not filled with water and there can be movement of air. Generally, the zone between the land surface and the water table, but a zone of aeration can exist below an artesian aquifer, and below a perched water body.
Unusual plant assemblages	Stands of vegetation identified in the California Desert Conservation Act which can be recognized as extraordinary due to one or more factors, which are unusual age, unusual size, unusually high cover or density, or disjunction from main centers of distribution.
Visual resource	The physical features of a landscape which can be seen (e.g., land, water, vegetation, structures, and other features).
Visual Resource Management (VRM)	The systematic means to identify visual values, establish objectives which provide the standards for managing those values, and evaluate the visual impacts of proposed projects to ensure that BLM objectives are met.
Wilderness Study Area (WSA)	A roadless area of public lands which the BLM has determined may possess the wilderness qualities described in the Wilderness Act of 1964. WSAs were established in order to study the suitability of the areas for possible designation as wilderness by Congress. BLM protects each WSA's wilderness qualities until Congress decides whether or not the WSA will be designated as wilderness.
Zone of influence	The area overlying the cone of pumping depression, or cone of water table depression.

10.2 LIST OF ABBREVIATIONS

The definitions below are provided as clarification for abbreviations as used in this document.

ABBREVIATION	DEFINITION
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Trips
APCD	San Bernardino County Air Pollution Control District
AUM	Animal Units per Month
BLM	U.S. Bureau of Land Management
BP	Before Present
CARB	California Air Resources Board
CDCA	California Desert Conservation Area
CEQA	California Environmental Quality Act of 1970 as amended
CESA	California Endangered Species Act
CFR	Code of Federal Regulations, 1987
County	County of San Bernardino, unless otherwise designated.
CNDDB	California Natural Diversity Data Base
CNPS	California Native Plant Society
DEHS	County of San Bernardino Department of Environmental Health Services
DFG	California Department of Fish and Game
DWR	State of California Department of Water Resources
EIS/EIR	Environmental Impact Statement/Environmental Impact Report
EMNSA	East Mojave National Scenic Area
EPA	U.S. Environmental Protection Agency
ESA	Federal Endangered Species Act
FLPMA	Federal Land Policy Management Act
FWS	U.S. Fish and Wildlife Service
gpm	gallons per minute
ICC	Interstate Commerce Commission
IMP	Interim Management Policy and Guidelines for Wilderness Review
MCL	Maximum Contamination Level
MRZ	Mineral Resource Zone

TERM	DEFINITION
MSHA	Mine Safety and Health Administration
MTY	Million Tons Per Year
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act
NPPA	Native Plant Protection Act
NRHP	National Register of Historic Places
OPT	Ounces per Ton
O/T	Ore per Ton
RWQCB	Regional Water Quality Control Board, Colorado River Basin
SBB&M	San Bernardino Baseline and Meridian
SBCAPCD	San Bernardino County Air Pollution Control District
SBDOT	San Bernardino County Department of Transportation
SHPO	State Historic Preservation Officer
SGL	State Game Lands
SMARA	California Surface Mining and Reclamation Act
tpy	tons per year
UPA	Unusual Plant Assemblage
USGS	U.S. Geological Survey
VRM	Visual Resource Management
WSA	Wilderness Study Area

CHAPTER 11.0
QUALIFICATIONS OF PREPARERS

11.0 QUALIFICATIONS OF PREPARERS

This Environmental Impact Statement/Environmental Impact Report has been prepared by Environmental Solutions, Inc. under the direction of the U.S. Bureau of Land Management, Needles Resource Area and the County of San Bernardino, Environmental Public Works Agency. Project Managers for BLM and the County provided information and assistance in preparing this report and independently evaluated the information contained herein.

11.1 AGENCIES

Bureau of Land Management, Needles Resource Area

John Bailey
East Mojave National Scenic Area Manager
B.A. Cultural Anthropology, 1975, Kent State University (Ohio)

- Ten years with BLM, including Outdoor Recreation Planner and Scenic Area Manager
- Four years with National Park Service (Grand Canyon National Park)

Bureau of Land Management, Las Vegas District Office

Roger Alexander
Natural Resource Specialist
B.S. Wildlife Management, 1977, New Mexico State University

- Eleven years with BLM, including Range Con. (Socorro, N.M.), Range Con. (Alamosa Co.), and Natural Resource Specialist (Needles, Ca.)

County of San Bernardino, Environmental Public Works Agency

Michael K. Lerch
Senior Environmental Analyst
B.S. Anthropology, 1981, University of California, Riverside
Ph.D. Anthropology, in progress, University of California, Riverside

- Ten years experience in environmental impact analysis, including Coordination of consultant-prepared EIRs, and Preparation of cultural resources assessments.

Joe Bellandi
Environmental Specialist IV, Mining Geologist
B.S. Earth Science (Geology), 1975, Montana State University

- Four years experience in mining/reclamation permitting

- Ten years experience as Mining Engineer, including Highmont Operating Corporation (British Columbia), Inspiration Consolidated Copper Company (Arizona), and Anaconda Copper Company (Montana).

11.2 CONSULTANTS

Environmental Solutions, Inc.

Richard D. Ellison, President
Principal
Ph.D. Civil (Geotechnical) Engineering, 1969, Carnegie-Mellon University
M.S. Civil (Geotechnical) Engineering, 1967, Carnegie-Mellon University
B.S. Civil Engineering, 1965, Carnegie-Mellon University

Professional Engineer registered in 25 states. Twenty-five years of experience in project management and engineering. Environmental Project manager for various types projects including:

- Environmental Impact Reports and Environmental Assessments
- Waste Discharge Requirement Application Reports
- Air Quality Permitting
- Conditional Use Permits and Building Permits
- Water Supply and Ground Water Basin Analyses
- Head Leach Mine Facility Designs

Project Engineer for numerous geotechnical and environmental studies for military, commercial, and industrial facilities.

EIS/EIR principal areas of responsibility: quality control and water resources.

David E. Brown
Environmental Planner
M.S. Geography, 1984, University of California
B.S. Geography, 1980, University of California

Seven years of experience in environmental baseline assessment and impact analysis including:

- Comprehensive and Focused Environmental Assessments, Environmental Impact Statements, and Environmental Impact Reports
- Technical reports including socioeconomic and cost/revenue studies, land use consistency evaluation, and visual impact analyses
- Permitting activities for residential, commercial, and industrial projects

EIS/EIR principal areas of responsibility: NEPA/CEQA compliance, introduction, description of proposed action and alternatives, vegetation, visual resources, land use, and cumulative impacts.

Carolyn E. Trindle
Environmental Planner
M.A. Business Administration, 1981, Pepperdine University, Irvine, CA
M.A. Secondary Education, 1974, University of Missouri, Kansas City
Bachelor of Journalism, 1965, University of Missouri, Columbia

Twelve years of experience as environmental planner for various projects including:

- Environmental Impact Statements, Environmental Assessments, and Environmental Impact Reports
- Socioeconomic and planning documents for proposed industrial projects and military installations
- Environmental documents for establishing the F/A-18A aircraft at Kaneohe Bay, Oahu, Hawaii, and for impacts of constructing satellite earth stations in urban Southern California locales
- Preparation and coordination of permits for waste discharge, water quality, air quality, wildlife, and special use permits as well as Plans of Operation for major mining projects

EIS/EIR principal areas of responsibility: quality control and description of proposed action and alternatives.

C. Marshall Payne
Associate Principal Geologist
M.S. Engineering Geology, University of Arizona, Tucson
B.S. Geology, Arizona State University, Tempe
Registered Geologist, Certified Engineering Geologist, Registered Geophysicist

- Over twenty-five years experience in geologic engineering on a broad scope of projects
- Principal Geologist for site assessments and leachate treatment workplans for major landfills
- Geologic, hydrogeologic, and seismic studies for Environmental Impact Statements
- Principal Geologist for environmental assessment of hydrogeologic conditions on Nevada and California gold mines
- Experience in geologic mapping and site characterization for waste facilities including Class I and Class II-1 and nuclear

EIS/EIR principal area of responsibility: geology.

Greg S. Kindt
Chemical Engineer
B.S. Chemical Engineering, 1985, South Dakota School of Mines and Technology

Three years experience in air pollution control technology and environmental research for projects including:

- Environmental Impact Statements
- Air Quality Assessments
- Hazardous Waste Assessments

EIS/EIR principal areas of responsibility: air quality and environmental health and safety.

John Mauk
Assistant Environmental Planner
M.A. Geography, 1979, California State University, Long Beach
B.A. History, 1975, California State University, Long Beach

Ten years of experience in preparation and processing of environmental documents.

- Working knowledge of regulatory requirements
- Preparation of Socioeconomic studies
- Capital improvements and annexations

EIS/EIR principal areas of responsibility: socioeconomics and infrastructure.

Joni L. Fisher
Hydrogeologist
B.S. Geology, 1984, University of South Florida

- Advanced knowledge of database creation and application of computer models to hydrogeologic conditions
- Experience in mining industry research on acid mine drainage, mining wastewater, cyanidation, ground water movement through fracture media
- Field experience in landform and soil reconnaissance mapping, site screening, and boring logging

EIS/EIR principal area of responsibility: water resources.

Frank J. Hagar
Hydrogeologist
B.S. Geological Engineering, Colorado School of Mines
Geologic Engineering Degree, Colorado School of Mines

- Eleven years experience in geologic and hydrogeologic studies including mine and mill hydrogeology, engineering geology, well field analysis, well installation, geophysics, statistics, and saturated and unsaturated flow modeling

EIS/EIR principal area of responsibility: water resources.

Wildlife and Vegetation

Bayard H. Brattstrom
Professor of Zoology, California State University, Fullerton
Ph.D., 1959, University of California, Los Angeles
M.A., 1953, University of California, Los Angeles
B.S., 1951, San Diego State College

Over thirty-five years experience in education and wildlife research.

- Biologic research and study design for: background, literature review, long- and short-term history of sites, habitat inventory and mapping, plant and animal surveys, food, feeding, food web construction, resources and resource utilization, habitat quality, habitat diversity, data collection analysis and interpretation, community and population analysis, climate, microclimate, noise effects, habitat destruction, inventories, protected species, species mapping, cost/benefit analysis, impact and mitigation
- Environmental consultant for Federal, State, and local agencies including U.S. Army Corps of Engineers, U.S. Bureau of Land Management, U.S. Navy, U.S. Air Force, U.S. Forest Service, State of California Department of Fish and Game and California Department of Parks and Recreation, as well as numerous cities and counties
- Author of over 130 publications on fauna of arid, temperate, and tropical environments

EIS/EIR principal area of responsibility: wildlife.

Michael J. O'Farrell
Environmental Consultant
Ph.D., 1973, University of Nevada, Reno
M.S., 1971, New Mexico Highlands University
B.S., 1968, University of Nevada, Las Vegas

- Biological resource survey, impact assessment and mitigation analyses for numerous energy development projects including gas and oil, geothermal, power plant and transmission lines, solar and hydroelectric energy as well as residential, commercial, and industrial projects
- Environmental consultant for Federal, State, and local agencies including U.S. Forest Service, U.S. Fish and Wildlife Service, U.S. Bureau of Land Management, U.S. Park Service, U.S. Navy, U.S. Air Force, U.S. Army Corps of Engineers, U.S. Army, and State of California Department of Fish and Game
- Author of over 50 publications, primarily on bats

EIS/EIR principal area of responsibility: wildlife (bat inventory).

Alan P. Romspert
Assistant Director, Soda Springs Field Station, California Desert Consortium
M.A., 1975, California State University Fullerton
B.A., 1970, California State College, Fullerton

Over fifteen years experience in education and research of southwestern flora and fauna.

- Experience in research of animal physiology, desert flora, and herpetology
- Publications on sensitive plant species and on osmoregulation of terrestrial salamander and African clawed frog

EIS/EIR principal area of responsibility: vegetation.

Patrice E. Gould
Environmental Consultant
B.A., 1986, Humboldt State University

- Biological resources inventories and assessments for land development applications. Preparation of literature reviews and species records searches, field studies of flora and fauna, and compilation and evaluation of data
- Experience with bighorn sheep surveys, Mojave ground squirrel studies, raptor surveys, rare plant surveys, and rare reptile surveys

EIS/EIR principal area of responsibility: wildlife.

<u>Air Quality</u>

URS Consultants, Inc.
412 West Hospitality Lane, Suite 208
San Bernardino, California 92408

URS has extensive experience in managing and preparing all levels of air quality analyses. Air quality permitting for major energy projects nationwide has required meteorological and air quality monitoring, dispersion modeling and interpretation, and development of control technology. URS has performed numerous air quality assessments for environmental impact statements, reports, and assessments for a wide variety of projects including:

- Transportation corridors
- Power plant siting and transmission facilities
- Water supply facilities
- Wastewater treatment facilities
- Industrial facilities
- Mining development
- Multi-land use projects

- Residential development
- Energy facilities
- Offshore oil and gas development
- Defense projects
- Land use master plans

URS also provides modeling protocol for performing health risk assessments for non-criteria pollutants.

Archaeology

Philip J. Wilke
Archaeological Research Unit
University of California, Riverside
Riverside, California 92521

EIS/EIR principal area of responsibility: cultural resources.

T. D. Burke
Archaeological Research Services
Post Office Box 701
Virginia City, Nevada 89440

EIR/EIR principal area of responsibility: cultural resources.

CHAPTER 12.0
ORGANIZATIONS AND PERSONS CONSULTED

12.0 ORGANIZATIONS AND PERSONS CONSULTED

The persons and organizations listed below were contacted or submitted comments during preparation of this document.

12.1 FEDERAL AGENCIES

• U.S. Bureau of Land Management Needles Resource Area P.O. Box 888 Needles, California 92363	Everell Hayes, Area Manager
• U.S. Bureau of Land Management Las Vegas Resource Area 4765 Vegas Drive Las Vegas, Nevada 89126	Renore Wycoff, Area Manager Roger Alexander
• U.S. Fish and Wildlife Service Laguna Niguel Field Office 2400 Avila Road Laguna Niguel, California 92656	Nancy Kaufman, Field Supervisor

12.2 STATE OF CALIFORNIA

• California Division of Mines and Geology 650 Bercut Drive Sacramento, California 95814-0131	James Pompy, Mine Reclamation Program Manager
• California Department of Transportation District 8 P.O. Box 231 San Bernardino, California 92402	Guy Visbal, Chief, Transportation Planning
• Office of Planning and Research 1400 Tenth Street, Room 121 Sacramento, California 95814	David Nunenkamp, Chief of Office Permit Assistance
• University of California, Berkeley Museum of Vertebrate Zoology 2593 Life Sciences Building Berkeley, California 94720	Robert Stebbins, Curator of Herpetology Professor Curator of Zoology

12.3 STATE OF NEVADA

• Nevada Department of Wildlife Region III Stateroom Mailroom Complex Las Vegas, Nevada 89158	John Donaldson, Regional Manager

12.4 SAN BERNARDINO COUNTY, CALIFORNIA

• Land Management Department 300 North D Street San Bernardino, California 92418	Joe Bellandi Michael Lerch Dennis LeFevre
• San Bernardino County Museum 2024 Orange Tree Lane Redlands, California 92374	Dr. Allan Griesemer, Museums Director
• Department of Transportation 825 East Third San Bernardino, California 92415-0835	Mary Anne Cooley, Road Book Clerk Danny Castro, Census Technician

12.5 CLARK COUNTY, NEVADA

• Clark County Department of Public Works 401 South Fourth Street Las Vegas, Nevada 89101	Gary Loberg, Assistant Real Property Agent

12.6 PRIVATE ORGANIZATIONS

• The Wilderness Society 179-A Pine Street San Francisco, California 94109	Patricia Schifferle, Regional Director
• California Desert Protection League 3550 West Sixth Street Suite 323 Los Angeles, California 90020	Elden Hughes, Director
• Defenders of Wildlife 5604 Rosedale Way Sacramento, California 95822	Richard Spotts, Representative
• Sierra Club Legal Defense Fund, Inc. 2044 Filmore Street San Francisco, California 94115	Deborah Reams, Attorney
• Sea and Sage Audubon P.O. Box 1779 Santa Ana, California 92702	Nancy Klotzsche, Conservation Committee
• Citizens for Mojave National Park P.O. Box 106 Barstow, California 92311	Peter Burk, President

12.7 INDIVIDUALS AND BUSINESSES

- R.M. Gibbons
  236 South Rainbow, #233
  Las Vegas, Nevada 89128

- George Hufford
  3178 Gregory Drive
  Mojave, California 93501-1308

- Harry Metzger
  227 Ashlar Drive
  Napa, California 94558

- Kenneth Rein
  12245 Sunset Parkway
  Los Angeles, California 90064

- Tom Rudy
  2033 Pommel Avenue
  Las Vegas, Nevada 89119

- Laura Woodley Smith
  17430 Horace Street
  Granada Hills, California 91344

- Robert Zaebst
  793 Masita Drive
  Boulder City, Nevada 89005

- Jake's Crane & Rigging, Inc.
  6109 South Industrial Road
  Las Vegas, Nevada 89118

CHAPTER 13.0
REFERENCES

13.0 REFERENCES

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California Department of Fish and Game (DFG). 1988. "Endangered, Rare, and Threatened Animals of California." Revised June 1, 1983. Sacramento, California: The Resources Agency, Department of Fish and Game.

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- Item 1, Mining Reclamation Summary Form and Mining Reclamation Plan
- Items 2, 4, and 5, Site Approval Form, Environmental Assessment Summary, Surrounding Property Owners List, Hazardous Waste Site Certification. Las Vegas, Nevada.

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* Documents on file and available for public review at: County of San Bernardino, Land Management Department.

** Document on file and available for public review at: BLM, Needles Resource Area; BLM, California Desert District.

CHAPTER 14.0
INDEX

14.0 INDEX

This index has been prepared in compliance with NEPA regulations and to aid the reader in locating sections in this document where major issues and subjects of concern are discussed.

APPENDIX A
NOTICE OF INTENT AND INITIAL STUDY

APPENDIX A

NOTICE OF INTENT AND INITIAL STUDY

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
CALIFORNIA DESERT DISTRICT
1695 Spruce Street
Riverside, California 92507

RECEIVED
BUREAU OF LAND MANAGEMENT
1988 MAY -2 AM 11:09
NEEDLES RESOURCE AREA
NEEDLES, CA.

RECEIVED
MAY - 1988
APR 28 1988

IN REPLY REFER TO:
1792 (CMP)
(CA-069.29)

Director, Office of the Federal Register
National Archives and Records Service
General Services Administration
Washington, D.C. 20408

Gentlemen:

Enclosed are three signed copies of a Notice of Intent to conduct public scoping meetings and prepare an Environmental Impact Statement relative to the proposed development of the Castle Mountain Project open pit, heap leach gold mine for publication in the Federal Register.

We would appreciate publication in the Federal Register no later than May 6, 1988, because of widespread public interest in these meetings.

Thank you for your assistance.

Sincerely,

HW Riecken

Hugo W. Riecken
Associate District Manager

Enclosures

Billing Code: 4310-40
8-00160

Proposed Castle Mountain Project
San Bernardino County, California

AGENCY: Bureau of Land Management, Interior

ACTION: Notice of Intent

SUMMARY: Notice is hereby given that the Bureau of Land Management will have an Environmental Impact Statement prepared under contract for the proposed Castle Mountain Project open-pit, heap-leach gold mine and will conduct public scoping meetings in connection with the preparation of that document.

Viceroy Gold Corporation has proposed development of an open-pit, heap-leach gold mine in the Castle Mountains of northeastern San Bernardino County, California. The proposed Castle Mountain Project is located near the California-Nevada border approximately 18 miles southwest of Searchlight, Nevada in the East Mojave National Scenic Area. The proposed mine and related processing facilities will ultimately affect approximately 670 acres of Public lands in the California Desert Conservation Area, five acres of Public lands in Nevada, and 28 acres of patented claims in San Bernardino County, California.

The Bureau of Land Management, together with San Bernardino County as State of California co-lead, will have a joint Environmental Impact Statement/ Environmental Impact Report (EIS/EIR) prepared under contract to assess the impacts of mining, construction and operation of the heap-leach processing facility, construction and maintenance of access roads, development of a water well field and pipelines, and reclamation of disturbed lands. In addition, the EIS/EIR will consider alternative technologies, alternative siting of components, including access roads, heap-leach pads, processing facilities, waste dumps, water wells and pipelines, and alternative sources of water and power.

The EIS/EIR will be prepared by an independent environmental consulting firm which will consider the following general issues: water resources (specifically the relationship between groundwater flows in Lanfair Valley and surface flow in Piute Creek), special areas, wildlife resources including species of concern), botanical resources (including species of concern), cultural resources, existing and potential land uses, recreation, visual resources, air quality, grazing, and transportation, storage, and disposal of hazardous wastes.

Two public scoping meetings will be conducted prior to actual preparation of the EIS/EIR in order to receive public comments, concerns, and interests which should be addressed in the document. Issues raised during these meetings will be considered in the EIS/EIR in addition to those issues which have already been described.

DATE AND TIME		LOCATION
May 23, 1988	7:00 PM	LAS VEGAS, NEVADA Board Room Clark County Education Center 2832 East Flamingo Road
May 26, 1988	6:30 PM	BARSTOW, CALIFORNIA Conference Room Barstow Station Super 8 1511 East Main Street

FOR FURTHER INFORMATION, CONTACT:

Roger Alexander, Project Leader, Bureau of Land Management, Needles Resource Area, P.O. Box 888, Needles, California 92363, (619) 326-3896.

H W Riecken

Hugo W. Riecken, Associate District Manager

4/28/88

Date

LAND MANAGEMENT DEPARTMENT

5 North Arrowhead Avenue • San Bernardino, CA 92415-0180 • (714) 387-4091

COUNTY OF SAN BERNARDINO
ENVIRONMENTAL
PUBLIC WORKS AGENCY

JOHN N. JAQUESS
Land Management Director

OFFICE OF PLANNING
Sharon W. Hightower
County Planning Officer

OFFICE OF SURVEYOR
Claude D. Tomlinson, L.S.
County Surveyor

OFFICE OF BUILDING AND SAFETY
Larry L. Schoelkopf, P.E.
County Building Official

June 22, 1988

To: Responsible Agencies
Interested Citizen Groups
Surrounding Property Owners

Subject: NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

The Environmental Analysis Section of the County of San Bernardino Office of Planning will be the Lead Agency and will be preparing an Environmental Impact Report for the Viceroy Gold Corporation Castle Mountain Project. Because the proposed project is subject to both the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), the document prepared will be a joint EIS/EIR, for which the Bureau of Land Management, California Desert District, will be the NEPA lead agency.

The proposed project is a surface gold mining and processing project in the Hart Mining District of eastern San Bernardino County, California. Open-pit mining and related processing activities are proposed on 670 acres of public lands and approximately 28 acres of patented claims.

Issues of concern to be addressed in the EIR include: Soils and Geology; Air Quality; Hydrology; Flora and Fauna; Noise; Light and Glare; Land Use; Transportation/Circulation; Aesthetics; Recreation; Cultural and Paleontological Resources; and possibly Utilities.

This letter is a request for environmental information that you or your organization feel should be addressed in the Environmental Impact Report. Detailed information may be included in your response. Due to time limits, as defined by the California Environmental Quality Act, your response should be sent at the earliest possible date, but no later than 30 days after receipt of this notice.

Should you have any questions, please call the Environmental Analysis Team at (714) 387-4146.

Sincerely,

EPWA/LAND MANAGEMENT DEPARTMENT
OFFICE OF PLANNING

Joe Bellandi

JOE BELLANDI, MINING GEOLOGIST
ENVIRONMENTAL ANALYSIS TEAM

Attachments: Location maps
Initial Study
Conditions of Approval

INITIAL STUDY ENVIRONMENTAL CHECKLIST FORM

(Completed By Project Planner)

This form and the descriptive information in the application package constitute the contents of Initial Study pursuant to County Guidelines under Ordinance 3040 and Section 15063 of the State CEQA Guidelines.

I. T14N,R17E,Sec 13,23,24,25,26

Viceroy Gold Corp T14N,R18E,Sec 19,30

Aerial No: ______________

Thomas Bros: 703-707-708

Community Plan/
General Plan: RCN

Zoning: DL & DL-40

PROJECT CHARACTERISTICS: The Castle Mountain Project is a proposed surface gold mining and processing project in the Hart Mining District of eastern San Bernardino County, California. Mining and related processing activities are planned to occur on approximately 670 acres of public lands in the California Desert Conservation Area, five acres of public lands in Nevada, and 28 acres of patented claims in San Bernardino County, California. The proposed mine is located some 23 miles southwest of Searchlight, Nevada and 9 miles east of Barnwell, California as shown in Figure 1, Regional Location. Access to the site would be provided via an existing road from Barnwell and from Searchlight Nevada on an extension of an existing county road, shown in Figure 2, Vicinity Map.

The project includes the following general types of project facilities: (1) mining facilities (open pits and overburden stockpile); (2) processing facilities (crushing equipment, leach pads and ponds, gold recovery plant); and (3) ancillary facilities (water supply and access road). These facilities are illustrated in Figure 3, Site Plan and Facilities.

The proposed Castle Mountain Project would mine ore reserves from three deposits known as the Lesley Ann, Oro Belle and Jumbo. Approximately 2.8 million tons of ore and 6 million tons of overburden would be removed annually by mining operations. This operation is anticipated to occur over an estimated period of 10 years.

Mining operations would involve a number of related processes and facilities. Ore and overburden would be mined using open-pit methods. Ore removed from the mine would be transported by truck over haul roads to crushing facilities, while overburden would be taken to a permanent stockpile area.

At the crushing facilities, ore would be crushed, screened, agglomerated with cement and transported to pads by conveyor for heap leaching. Leaching solutions would be applied to the heaps of ore to remove gold. Once leaching has occurred, the solution would drain into solution ponds and be pumped to the processing plant. Gold would be removed from the solution through a carbon adsorption process, formed into bullion, and shipped to a refinery for further purification.

The project will have a comprehensive Reclamation Plan for the mined areas, waste dumps, processing facilities, leach pads, roads and storage ponds.

the pad area and less in the pit areas. Based on the biological survey, the estimated number of Joshua trees and Mojave yuccas to be disturbed by mining activities is approximately 2,800+ each.

Vegetation in Lanfair Valley has been impacted by cattle grazing since the early 1900s, and in the immediate vicinity of the property, by previous mining-related activities. On the valley floor, desert grassland can be considered a phase of the predominant Joshua Tree woodland community.

	Land Use	General Plan	Zoning
North	East Mojave National Scenic Area/Open Space	RCN	DL-40
South	East Mojave National Scenic Area/Open Space	RCN	DL-40
East	East Mojave National Scenic Area/Open Space	RCN	DL-40
West	East Mojave National Scenic Area/Open Space	RCN	DL-40

NOTE:

This form is to be used for all applications except Minor Subdivisions and/or Certificates of Compliance. Mergers, Lot Line Adjustments and Major Deviations do not have environmental review.

II. Identification of maximum potential environmental effects of the proposed project. Purpose is to identify any potentially significant impacts and discuss mitigation measures for identified impacts. Please substantiate your responses by summarizing your assessment of significant impacts and referencing documents used as research (e.g., Norton Air Force Base AICUZ study re: Noise). Include quantification of changes caused by the project's development at maximum potential buildout from existing status.

Circle or underline specific item of concern for "yes" or "maybe" answers if one item applies and others do not.

	Yes	Maybe	No
1. SOILS/GEOLOGY. Will the proposal result in:			
a. Unstable earth conditions or changes in geologic substructures (onsite)?	X		
b. Exposure of people or property to geologic hazards such as earthquakes, landslides, mudslides, ground failure, or similar hazards (offsite)?			X
c. Change in topography or ground surface relief features?	X		

		Yes	Maybe	No
b.	Changes in absorption rates, drainage patterns, or the rate and amount of surface runoff?	X		
c.	Alterations to the course or flow of flood waters?	X		
d.	Change in the amount of surface water in any water body?		X	
e.	Discharge into surface waters, or in any alteration of surface water quality, including but not limited to, temperature, dissolved oxygen or turbidity?			X
f.	Alteration of the direction or rate of flow of groundwaters?		X	
g.	Change in the quantity of groundwaters, either through direct additions or withdrawals, or through interception of an aquifer by cuts or excavations (onsite)?	X		
h.	Pollution, contamination, or any change in the quality of groundwater (toxics, nitrates, fluorides, salts, etc)?		X	
i.	Substantial reduction in the amount of water otherwise available for public water supplies (offsite)?			X
j.	Exposure of people or property to water related hazards such as flooding or seismic seiche?			X

SUBSTANTIATION:

a. Dry wash channels will be temporarily diverted away from project facilities.

b. Ground compaction and impervious ground cover for some project facilities could locally reduce ground absorption rates and increase runoff during storms. Surface drainage will be altered as described in (a).

c. Alteration of surface drainage as presented in (a) would change the direction of flood flows in local washes during storm flow periods.

d. Surface streams dependent on Lanfair Valley groundwater resources could be affected by groundwater withdrawals by the project.

f. Project-related groundwater withdrawals could affect the rate of local groundwater flow.

g. The project could result in the withdrawal of an average of about 1,140 acre-feet of groundwater annually from the Lanfair Valley basin.

h. The possibility exists for the unwanted discharge of cyanide based solutions.

species to hazards from passing vehicles. Sensitive species (as recognized by Federal agencies and the California Natural Diversity Data Base) Bendire's thrasher (Toxostoma bendirei), Golden eagle (Aquila chrysaetos) and Desert bighorn sheep (Ovis canadensis var.nelsoni), have also been sighted in habitat similar to that to be removed by project activities or in the vicinity of the project site.

c. Fencing around project facilities could locally inhibit the movement of some animals.

d. As above in (a).

6. NOISE. Will the proposal result in:

	Yes	Maybe	No
a. Increases in existing noise levels?	X		
b. Exposure of people to severe noise levels?		X	—> X

SUBSTANTIATION:

a. Mining operations, including blasting, vehicle operation, equipment operation and power generators will increase noise levels at the project site.

b. Mine employees could be exposed to high noise levels associated with operations. The mine operator will comply with mandatory Federal and state regulations to protect employees from these noise levels.

7. LIGHT AND GLARE. Will the proposal produce:

	Yes	Maybe	No
A. New light or glare?		X	

SUBSTANTIATION: 24 hours per day operations within the project site area will require nighttime illumination of facilities and activity areas.

8. LAND USE. Will the proposal result in:

	Yes	Maybe	No
a. A substantial alteration of the present or planned land use of an area?	X		
b. Loss of agricultural soils (as defined by State Important Farmland Series).		X	

SUBSTANTIATION: The site is located in the East Mojave National Scenic Area. Mining operations at the project site will preclude current grazing activities and some recreational activities in the area. Long-term constraints on access or alterations to the local environment will change future opportunities for some recreational and grazing uses.

	Yes	Maybe	No
c. Substantial impact upon existing transportation systems?	___	___	X
d. Alterations to present patterns of circulation or movement of people and/or goods?	X	___	___
e. Alterations to waterborne, rail or air traffic?	___	___	X
f. Increase in traffic hazards to motor vehicles, bicyclists, equestrians or pedestrians?	___	X	___

SUBSTANTIATION:

a. The project will generate traffic that will be a substantial change to the existing circulation patterns.

d. The provision of an improved access road between the project site and Searchlight could increase general use and traffic in this area. The project will generate an average of four truck deliveries per day from Ivanpah via Barnwell.

f. Increased truck traffic on the Barnwell Road and increased commuter traffic on both access roads could increase traffic hazards for existing road users and recreationists.

13. PUBLIC SERVICES. Will the proposal have an effect upon, or result in a need for new or altered governmental services in any of the following areas:

	Yes	Maybe	No
a. Fire protection?	___	___	X
b. Police protection?	___	___	X
c. Schools?	___	___	X
d. Parks or other recreational facilities?	___	___	X
e. Maintenance of public facilities, including roads?	___	X -->	X
f. Other governmental services?	___	___	X

SUBSTANTIATION:

e. Increased road and road use by workers and trucks could increase the need for road maintenance of county roads. The increased road maintenance will be provided by the applicant.

14. ENERGY. Will the proposal result in:

	Yes	Maybe	No
a. Use of substantial amounts of fuel or energy?	X --	___ -->	X
b. Substantial increase in demand upon existing sources of energy, or require the development of new sources of energy?	___	___	X

SUBSTANTIATION: The proposed project will alter the existing scenic character of the site which is within the East Mojave National Scenic Area. This area has already been disturbed but the proposed project will add to the disturbance.

18. RECREATION Will the proposal result in:

	Yes	Maybe	No
a. An impact upon the quality or quantity of existing recreational opportunities?	X		

SUBSTANTIATION:

a. Recreational activities associated with the site and adjacent WSA's could be impacted by the proposed project.

19. CULTURAL RESOURCES. Will the proposal result in:

	Yes	Maybe	No
a. The alteration or destruction of a prehistoric/historic archaeological site?		X	
b. Will the proposal result in adverse physical or aesthetic effects to a prehistoric or historic building, structure, or object?		X	
c. Does the proposal have the potential to cause a physical change that would affect unique ethnic cultural values?			X
d. Will the proposal restrict existing religious or sacred uses within the potential impact area?			X

SUBSTANTIATION:

a. The access road from Searchlight will require improvements which may affect prehistoric sites and a historic railroad grade.

20. PALEONTOLOGICAL RESOURCES. Will the project result in:

	Yes	Maybe	No
a. Any alteration or destruction to fossil remains?		X	

SUBSTANTIATION: Sediments conducive to the preservation of paleontological resources have been reported in the area. Reported by Dr. Allan D. Griesemer, County Museum.

21. MANDATORY FINDINGS OF SIGNIFICANCE.

Yes Maybe No

IV. Mitigation Measures to be included in project Conditions of Approval.

Mitigation measures are proposed for incorporation into the project as Conditions of Approval. The EIR that is required for the project may incorporate additional conditions, modify the proposed conditions, or delete some of the proposed conditions.

Date | Initial Environmental Evaluation Prepared By:

June 20, 1988 | Roy Bellandi

On the basis of this initial evaluation:

The proposed project WOULD NOT have a significant effect on the environment, (and Mitigation Measures are included within the project's Conditions of Approval) and a NEGATIVE DECLARATION should be prepared. [ ]

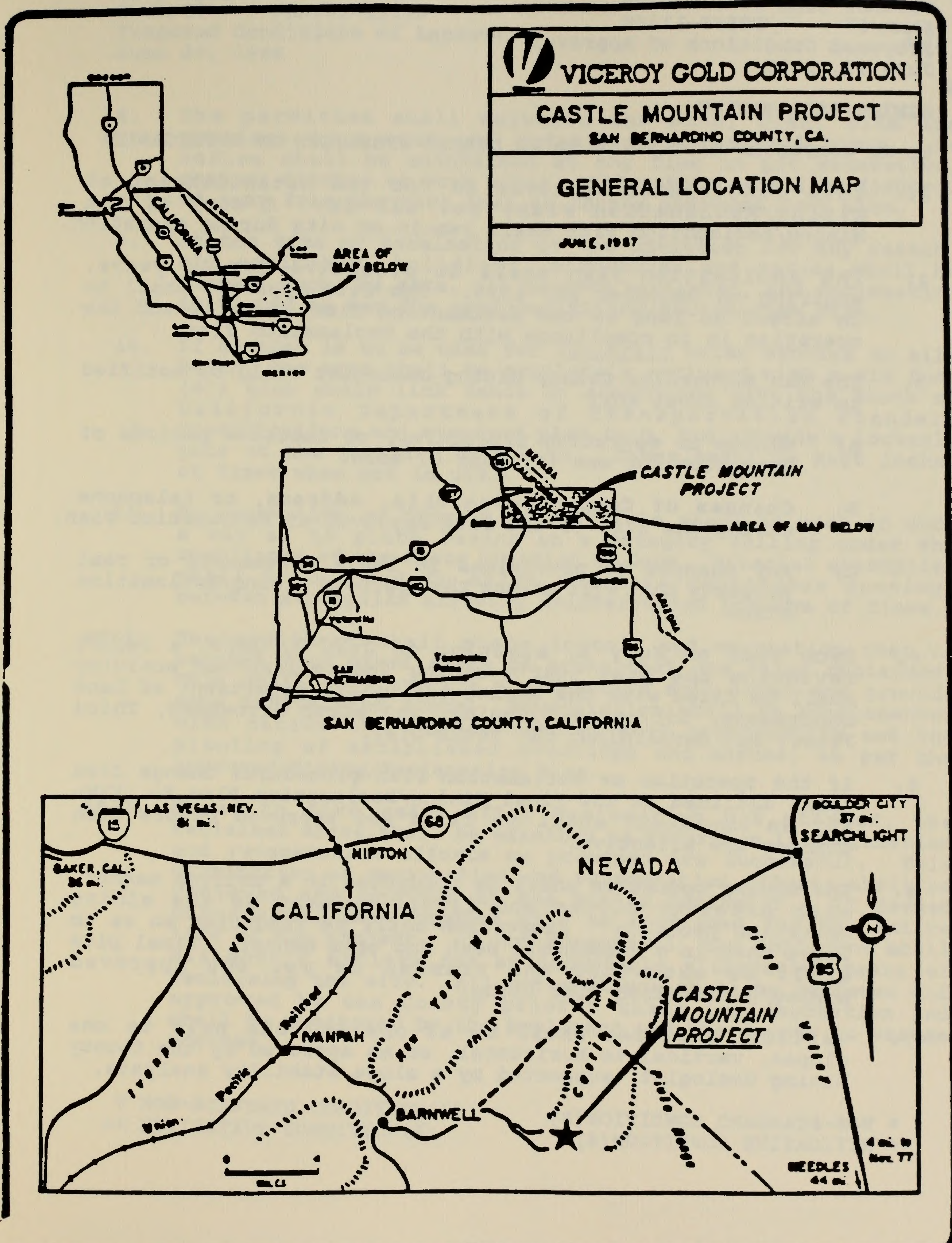
The proposed project MAY have a significant adverse effect on the environment, and an ENVIRONMENTAL IMPACT REPORT should be required. [X]

6-22-88 | Michael K Zoch

Date | Signature

For The Planning Agency

WPCIR:MINING:20/APPLICATIONS:44


VICEROY GOLD CORPORATION
CASTLE MOUNTAIN PROJECT
SAN BERNARDINO COUNTY, CA.
GENERAL LOCATION MAP
JUNE, 1987
CALIFORNIA
AREA OF MAP BELOW
NEVADA
CASTLE MOUNTAIN PROJECT
AREA OF MAP BELOW
SAN BERNARDINO COUNTY, CALIFORNIA
LAS VEGAS, NEV.
BOULDER CITY
SEARCHLIGHT
NIPTON
NEVADA
CALIFORNIA
IVANPAH
BARNWELL
CASTLE MOUNTAIN PROJECT
NEEDLES
44 mi

MINING/RECLAMATION

TO BE COMPLETED WITH PRIOR TO OR DURING OPERATION AS APPLICABLE:

1. This conditional approval is for the establishment of Mining/Reclamation Plan, No. XXM-XX. A copy of the Mining/Reclamation Plan shall remain on site during operation.

2. The Reclamation Plan shall be effective for 10 years, expiring on December 31, 1999. The Site Approval shall be in effect as long as the Reclamation Plan is valid and the operation is in compliance with the Reclamation Plan.

3. The San Bernardino County Mining Geologist shall be notified in writing about any:

   A) Change in operating procedures, or inactive periods of operation for one (1) year or more.

   B) Changes of Company ownership, address, or telephone during the life of the Site Approval or Reclamation Plan.

   C) Any changes to provisions in lease agreements or real property that will affect the approved Mining/Reclamation Plan.

4. Each year on July 1, starting on July 1, 1989, a report reviewing the past year's mining and reclamation activity shall be filed with the Mining Geologist, Department of Land Management, Office of Planning, 385 North Arrowhead, Third Floor, San Bernardino, CA 92415-0182.

5. If the operation or Reclamation Plan procedures change from those outlined in the Final Mining/Reclamation Plan No. XXM-XX, an amendment shall be filed and approved before such changes are effective.

6. The mining operation shall be conducted in a uniform manner, with exterior slopes and floors trimmed as the mining operation proceeds. Excavation shall be conducted so as to leave them in a reasonable neat and trim manner. Final pits shall be excavated and trimmed as per the approved Mining/Reclamation Plot Plans.

**7. Vertical surfaces shall be at one and one half to one slopes, vertical to horizontal, or as approved by the County Mining Geologist, supported by a slope stability analysis.

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

8. The permittee shall maintain the Mine, Plant site and premises in a neat and orderly manner at all times. No refuse shall be maintained at any time in pit excavation, channel ditches or work areas. All rubbish shall be disposed of away from the work area at County approved dump site.

9. At the time of termination of the operation for any reason, all equipment, buildings, structures and refuse shall be removed from the site, all hazards mitigated, and reclamation initiated as per the approved Mining/Reclamation Plan.

10. If an area is to be used for <u>temporary</u> water storage or silt basin, the area shall be completely enclosed with a six foot (6') high chain link fence in accordance with the State of California Department of Transportation standard specifications and standard plan f-10, and provide a lockable gate at the location of access. Gates shall be kept locked at times when not in use.

11. No excavation or deposit of materials shall be made in such a way as to place basins in a category falling under the cognizance of the State Division of Dams. Material stockpiles shall be aligned to allow adequate continuous openings between stockpiles allowing uninterrupted passage of flows.

**12. The applicant shall place topsoil and vegetation that is removed from mined areas on areas that are being reclaimed. This shall help provide a productive soil layer and provide some native seed stock. Revegetation shall be supplemented with native and locally adapted seed broadcasting and the planting of established seedlings and shrubs, as per the approved Mining/Reclamation Plan.

**13. Three to five years after Reclamation has started, the reclaimed areas shall be examined to determine if reclamation and revegetation efforts as proposed are successful. This examination of reclamation and revegetation efforts shall be reviewed and approved by the Mining Geologist. If deemed successful, this program will be continued for the entire life of the project. If not successful, the Applicant shall diligently explore for an acceptable alternative means of reclaiming the site. All alternatives shall be reviewed and approved by the County prior t their implementation and shall be monitored by the Applicant and the County to assure success.

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

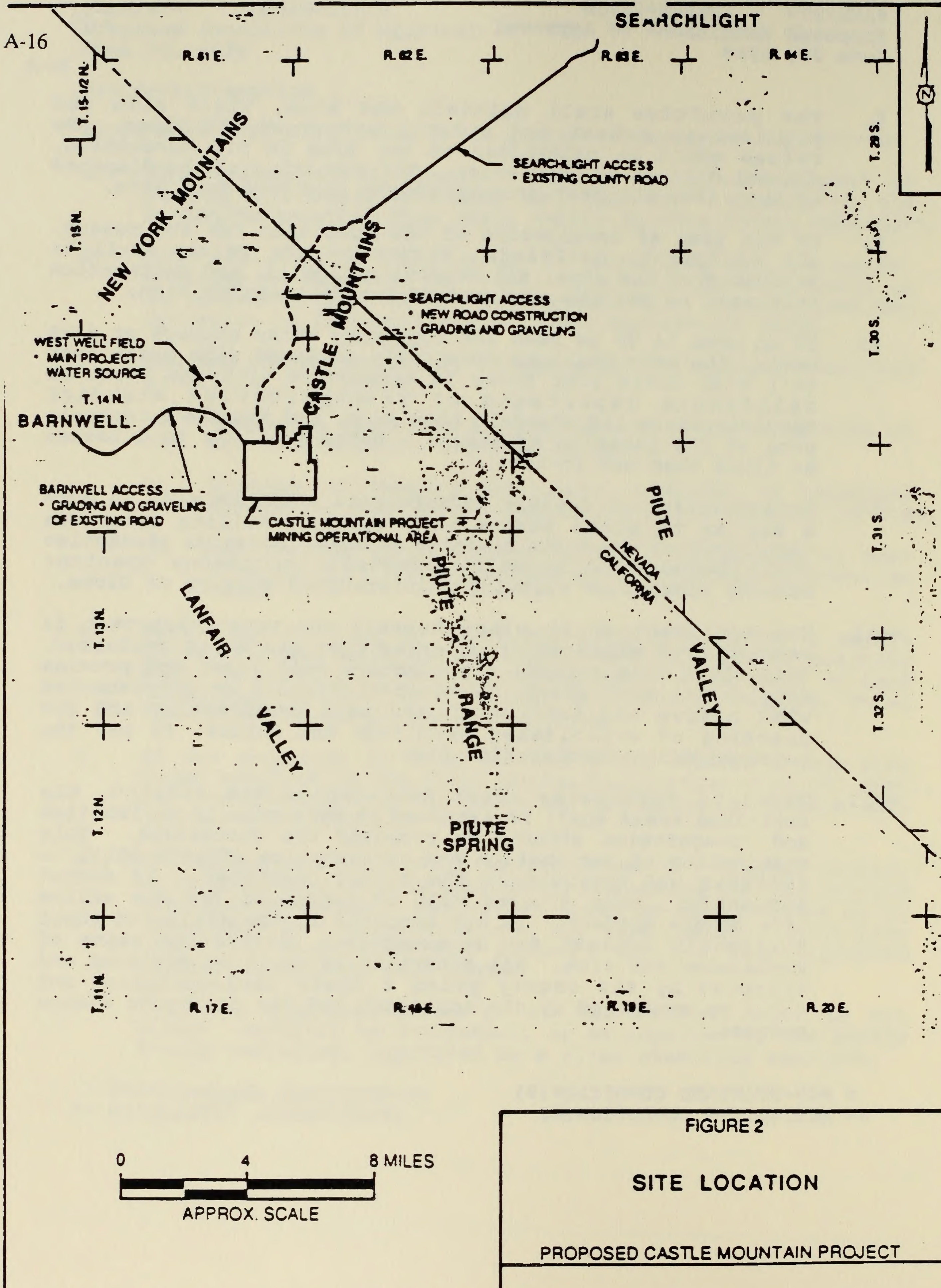


FIGURE 2

SITE LOCATION

PROPOSED CASTLE MOUNTAIN PROJECT

REVISED 5/21/88

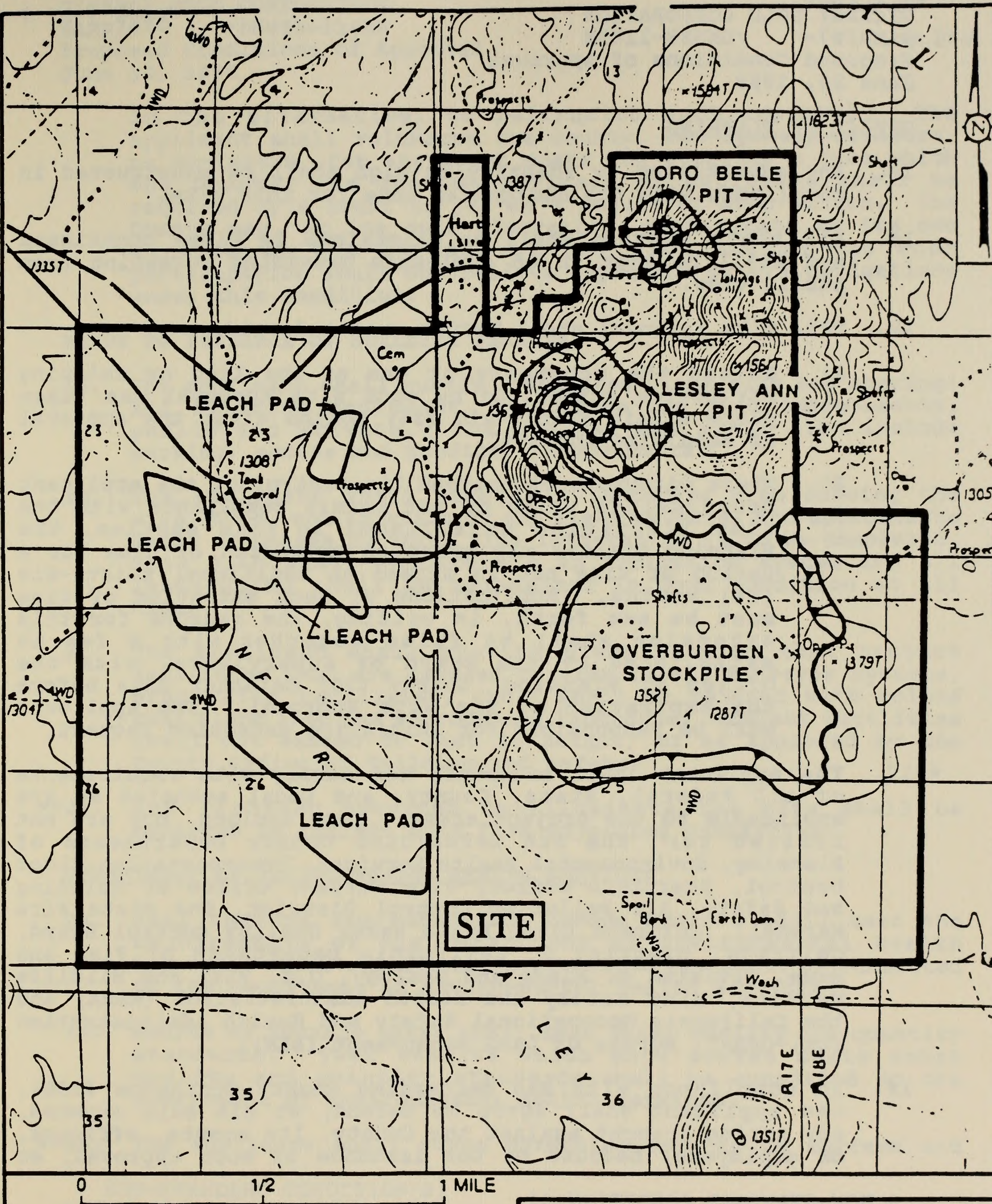


FIGURE 3

PROJECT SITE MAP

PROPOSED CASTLE MOUNTAIN PROJECT

REFERENCE. 15-MIN U.S.G.S. TOPOGRAPHIC MAP
OF CRESCENT PEAK QUADRANGLE,
CALIFORNIA, NEVADA
DATED 1956

OFFICE OF PLANNING

14. Any advertising or identifying sign shall be constructed in compliance with the designated zone for this site.

15. All trash storage shall be maintained in close containers and shall be kept in an enclosure providing screening from public view.

16. This Site Approval shall become null and void:

    A) Unless the occupancy or use of the land or existing structures authorized by such Site Approval has taken place within thirty-six (36) months after the approval of said Site Approval.

    B) Where circumstances beyond the control of the applicant cause delays which do not permit compliance with the time limitation established in this section, the Planning Officer may grant an extension of time for a period of time not to exceed an additional thirty-six (36) months. Applications of such extension of time must be set forth, in writing, the reasons for this extension shall be filed together with a fee as established by the Board of Supervisors, with the Office of Planning, thirty (30) calendar days before the expiration of the Site Approval. The applicant will be responsible for initiating extension request.

**17. The applicant shall ascertain and comply with requirements of all Federal, State, County, and Local agencies as are applicable to the project areas. They include, but are not limited to: the San Bernardino County Departments of Planning, Environmental Health Services, Transportation/Flood Control, Sheriff's Office, Fire Warden, Office of Building and Safety, Air Pollution Control District, The State Fire Marshall, Colorado River Basin Water Quality Control Board, CalTrans, District 8, California Department of Fish and Game, Division of Mines and Geology, U.S. Fish and Wildlife Service, Mine Safety and Health Administration (MSHA) and the California Occupational Safety and Health Administration (Cal-OSHA), Bureau of Land Management (BLM).

18. In compliance with San Bernardino County Ordinance #2684, the applicant shall agree to defend, at his sole expense, any action brought against the County, its agents, officers, or employees, because of the issuance of such approval, or

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

in the alternative, to relinquish such approval. The applicant shall reimburse the County, its agents, officers, or employers, for any Court costs and attorney's fees which the County, its agents, officers or employees shall be required by a court to pay as a result of such action. The County may, at its sole discretion, participate at its own expense in the defense of any such action but such participation shall not relieve applicant of his obligations under this condition.

PRIOR TO ISSUANCE OF BUILDING PERMITS:

19. The applicant shall submit a detailed plant site map showing: All building equipment, structures and road improvements, public and private. The revised map shall also include parking, access and handicap improvements.

20. The applicant shall provide a Landscape Plan showing the size, type, and location of all plant material and approximate dates or phases by which time landscaping is to be completed. Said Plan shall incorporate an irrigation system and all landscaping shall be maintained in good condition at all times.

21. The applicant shall provide plans showing that project facilities that are exposed to view (i.e., conveyor systems, processing facilities, etc.) shall be painted with colors that blend into the surrounding landscape. Project facilities shall not exceed 50 feet in height, or as approved by the County Office of Building and Safety.

**22. Any lighting provided to illuminate the site shall be arranged to reflect away from adjoining properties.

<u>DEPARTMENT OF ENVIRONMENTAL HEALTH SERVICES</u>

23. Soil testing for subsurface sewage systems shall meet the requirements of the Department of Environmental Health Services. Test results and appropriate fee shall be submitted to the Department of Environmental Health Services.

24. Source of potable water shall meet water quality and quantity standards. Test results which show source meets water quality and quantity standards shall be submitted to the Department of Environmental Health Services.

**25. The applicant shall abate potential impacts to surface and

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

groundwater associated with the on-site storage of fossil fuels, chemicals, ~~and~~ explosives, reagents and use of dust binding agents by mitigations through the implementation of applicable Colorado River Basin Regional Water Quality Control Board, San Bernardino County Department of Environmental Health Services and San Bernardino County Fire Marshall regulations. Use of above ground storage tanks requires the preparation of a contingency plan for secondary containment of potential leaks to the satisfaction of the CRWQCB and the County Department of Environmental Health Services, including the following:

- The containment area shall be designed to accommodate the volume of the tank plus a 24-hour, 100-year storm.

- If a series of tanks are involved, containment shall be provided for 10 percent of the combined capacity plus a 24-hour, 100-year storm.

Below ground storage tanks shall be subjected to following CRWQCB regulatory criteria:

- All tanks shall be registered with CRWQCB requirements and construction standards. The San Bernardino County Department of Environmental Health Services will be responsible for the issuance of permits and for the implementation of these requirements and standards.

- The County Department of Environmental Health Services shall inspect and approve said tanks, every three years for structural integrity.

FORESTRY AND FIRE WARDEN

26. All new construction shall comply with applicable sections of the 1982 Uniform Fire Code (Ordinance #2816), Development Code, Community Plans, and any other statutes, ordinances, rules and regulations regarding fires and fire prevention adopted by the State or County.

27. Each chimney used in conjunction with any fireplace or any heating appliance in which solid or liquid fuels is used shall be maintained with an approved spark arrester as identified in the Uniform Fire Code.

28. All flammable vegetation shall be removed from each building site a minimum distance of thirty (30) feet from any flammable

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

building material, including a finished structure.

OFFICE OF SURVEYOR
LAND DEVELOPMENT/DRAINAGE SECTION

**29. Adequate provisions shall be made to intercept and conduct the off-site tributary drainage flow around or through the site in a manner which will not adversely affect adjacent or downstream properties.

SAN BERNARDINO COUNTY
AIR POLLUTION CONTROL DISTRICT (SBC-APCD)

**30. The applicant shall submit detailed drawings and specifications to the SBC-APCD regarding the type of equipment that will be purchased and particle collection system that will be used.

**31. The applicant shall apply to SBC-APCD and obtain the required permits for the installation and operation of all fossil fuel equipment.

**32. The applicant shall establish a $50,000.00 cash bond with SBC-APCD for emission violations that may occur on the project site. The cash bond may be used to correct violations or for fines incurred by the applicant. If any portion or all of the $50,000.00 is used, the applicant must refund the bond to its $50,000.00 level. If the applicant maintains the operation within the rules and guidelines of the SBC-APCD, the bond shall be abolished and remanded back to the applicant.

**33. The applicant shall use biodegradable dust-binding agents such as "Weslig 120" on roadways and wet sweeping to reduce fugitive dust emissions on the access roads and around the new plants.

**34. The applicant shall install and maintain water spray systems at conveyor transfer points and stockpiles to reduce potential dust generation.

**35. If it is found that windblown particles and dust from the project site are a nuisance to surrounding areas, the applicant shall water construction/excavation sites more frequently. If this problem still persists, the applicant shall implement passive measures to control dust.

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

ENVIRONMENTAL ANALYSIS

**36. During the construction and operating phase, the project site will be checked on a daily basis before start-up, to remove and relocate any desert tortoise that may have wandered into the area. An employee of the Viceroy Gold Corporation, who has been instructed in the proper procedures for handling and moving tortoises, will conduct the sweeps.

**37. All barrel cactus, Joshua or Yucca Trees located on the project site shall be transplanted off site or removed by an approved nursery. Verification of removal or transplantation shall be submitted to the Mining Geologist for San Bernardino County prior to the establishment of any equipment of mining on site. The Applicant shall comply with the Plant Protection and Management provisions of the Development Code.

**38. In the event that project-related excavation uncovers a buried paleontological or archaeological deposit, work in the area will be halted and at the expense of the applicant, a qualified palaontologist or archaeologist will be contacted to evaluate the significance of the find and make recommendation as to its disposition. The applicant shall complete and fund all mitigation measures deemed necessary.

GENERAL CONDITIONS

39. The applicant shall provide San Bernardino County with a $2,000,000 cash bond for the Reclamation Plan and Mitigation measures. The security bond is not set up to replace the applicant's responsibility for reclamation or mitigation, but to assure funding for the approved Reclamation Plan. The bond agreement shall be reviewed and approved by County Counsel prior to the start of operation.

The security bond can be reduced periodically, by the cost of reclamation and mitigation measures as they are completed. The requirements for the bond will terminate when the approved project mitigation measures and final Reclamation Plan has been completed.

* NON-STANDARD CONDITION(S)
** MITIGATIVE CONDITION(S)

APPENDIX B
LIST OF PERMITS AND APPROVALS

APPENDIX B

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APPENDIX B

LIST OF PERMITS AND APPROVALS

PERMIT/APPROVAL	AGENCY OR APPROVING AUTHORITY	PURPOSE
FEDERAL		
Plan of Operations	Bureau of Land Management	Mine and Reclamation Plan Approval.
Environmental Impact Statement	Bureau of Land Management	Environmental Compliance.
Cultural Resource Permit	Bureau of Land Management	Section 106 Investigation.
Right-of-Way Easement or Special Use Permit	Bureau of Land Management	Electric power and water line rights-of-way.
Purchase and Storage of Explosives Permit	Department of Justice, Bureau of Alcohol, Tobacco, and Firearms	Purchase of explosives in one state for use in another.
Emergency Fire, Evacuation and Rescue Plans (55.4-39.B)	Department of Labor, Mine Safety, and Health Administration	Separate plans required for surface and underground operations.
Notice of Start of Operations	Department of Labor, Mine Safety, and Health Administration	Notice must be filed prior location and ownership.
Legal Identity Report	Department of Labor, Mine Safety, and Health Administration	Report on type of operation, location and ownership.
Record of Inspection of Self-Propelled Equipment (55.9-1)	Department of Labor, Mine Safety, and Health Administration	Must be maintained for six months and available to inspectors.
Record of Testing the Resistance of Electrical Ground System (55.12-28)	Department of Labor, Mine Safety, and Health Administration	Test required annually and after installation, repair, or modification. Record of tests must be available to inspectors.
Miner Training Plan (Title 30, Subchapter H, Part 48, Subpart B)	Department of Labor, Mine Safety, and Health Administration	Training by certified instructors is mandatory for all personnel.

PERMIT/APPROVAL	AGENCY OR APPROVING AUTHORITY	PURPOSE
STATE OF CALIFORNIA		
Waste Discharge Permit	Colorado River Basin Regional Water Quality Control Board	Surface and ground water quality control.
Ground Water Well Installation on State Lands	State Land Commission	Rights to install wells on State lands.
COUNTY OF SAN BERNARDINO		
Environmental Impact Report	San Bernardino County Land Management Department	Environmental Compliance.
Site Approval	San Bernardino County Land Management Department	Consistency with planning/ zoning.
Grading Plan Approval	San Bernardino County Department of Building and Safety	Compliance with appropriate codes and standards.
Building Plan Approval	San Bernardino County Department of Building and Safety	Compliance with appropriate codes and standards.
Building Permits	San Bernardino County Department of Building and Safety	Fire safety, building safety, compliance with appropriate codes and standards.
Approval of Mining/ Reclamation Plan	San Bernardino County Land Management Department	Satisfaction of Surface Mining and Reclamation Act.
Water System Permit	San Bernardino County Department of Environmental Health Services	Supply, storage, and distribution. System design, water quality.
Sewage Disposal System Permit	San Bernardino County Department of Environmental Health Services	Location, design, percolation rates for septic tanks and underground leaching fields.
Purchase and Use of Explosives	San Bernardino County Sheriff	Proper storage and handling, possibly bonding.

PERMIT/APPROVAL	AGENCY OR APPROVING AUTHORITY	PURPOSE
COUNTY OF SAN BERNARDINO (Continued)		
Water Well Permit and Inspection	San Bernardino County Department of Environmental Health Services	
Authority to Construct	San Bernardino County Air Pollution Control District (APCD)	Air pollution source location and control.
Permits to Operate	San Bernardino County APCD	Air pollution emissions, monitoring, and reporting.

APPENDIX C
WILDLIFE AND VEGETATION SPECIES LISTS

APPENDIX C

WILDLIFE AND VEGETATION SPECIES LISTS

TABLE OF CONTENTS

TABLE 1

LIST OF PLANTS EXPECTED TO OCCUR IN THE CASTLE MOUNTAIN AREA

ANGIOSPERMAE (DICOTYLEDONES)

ANACARDIACEAE - SUMAC FAMILY
Rhus trilobata anisophylla

ASCLEPIDACEAE - MILKWEED FAMILY
Asclepias erosa

APIACEAE - CARROT FAMILY
Cymopteris multinervatus
Lomatium nevadense

ASTERACEAE - SUNFLOWER FAMILY
Acamptopappus sphaerocephalus
Ambrosia dumosa
Ambrosia eriocentra
Artemisia ludoviciana
Baileya multiradiata
Baileya pauciradiata
Baileya pleniradiata
Brickellia arguta arguta
Brickellia californica californica
*Brickellia desertorum**
Brickellia oblongifolia linearifolia
Chaenactis stevioides brachypappa
Chrysothamnus paniculatus
Chrysothamnus teretifolius
Cirsium neomexicanum
Dyssodia cooperi
Ericameria (Haplopappus) cooperi cooperi
Ericameria (Haplopappus) cuneata cuneata (cuneatus cuneatus)
*Ericameria (Haplopappus) laricifolia (laricifolius)**
Ericameria (Haplopappus) linearifolia (linearifolius)
Encelia virginensis actoni
Erigeron divergens
Erigeron foliosus covillei
Erigeron pumilus concinnoides
Eriophyllum ambiguum
Gutierrezia microcephala
Gutierrezia sarathrae
Hymenoclea salsola salsola
Leucelene ericoides
Machaeranthera canescens
Machaeranthera canescens canescens
Machaeranthera tephrodes

* Plants not in flower; identification tentative

TABLE 1
(Continued)

ASTERACEAE - SUNFLOWER FAMILY - (Continued)
Malacothrix coulteri
Psilostrophe cooperi
Senecio multilobatus

Stephanomeria exigua exigua
Stephanomeria parryi
Stephanomeria pauciflora
Stylocline micropoides
Tetradymia stenolepis
Viguiera parishii (deltoides parishii)
Xylorhiza (Machaeranthera) tortifolia

BIGNONIACEAE - BIGNONIA FAMILY
Chilopsis linearis arcuata

BORAGINACEAE - BORAGE FAMILY
Amsinckia intermedia
Amsinckia tesselata
Cryptantha circumscissa
Cryptantha nevadensis
Cryptantha pterocarya
Cryptantha tumulosa
Pectocarya setosa
Plagiobothrys arizonicus

BRASSICACEAE - MUSTARD FAMILY
Arabis perennans
Arabis pulchra
Caulalnthus cooperi
Descurainia pinnata
Descurainia sophia
Draba cuneata
Lepidium fremontii
Lepidium lasiocarpum
Lesquerella palmeri
Sisymbrium irio
Stanleya pinnata pinnata
Streptanthella longirostris
Thysanocarpus curvipes
Thelypodium lasiophyllum

CACTACEAE - CACTUS FAMILY
Coryphanthya vivipara deserti
Echinocactus polycephalus
Echinocereus engelmannii chrysocentrus
Ferocactus acanthodes lecontei
Mammillaria tetrancistra
Opuntia acanthocarpa coloradensis
Opuntia basilaris basilaris

* Plants not in flower; identification tentative

TABLE 1
(Continued)

CACTACEA - CACTUS FAMILY - (Continued)
Opuntia chlorotica
Opuntia erinacea erinacea
Opuntia erinacea ursina
Opuntia stanleyi parishii

CARYOPHYLLACEAE - PINK FAMILY
Arenaria macradenia

CHENOPODIACEAE - GOOSEFOOT FAMILY
Atriplex canescens
Ceratoides (Eurotia) lanata
Chenopodium incanum occidentale
Grayia spinosa
Salsola iberica

CUCURBITACEAE - GOURD FAMILY
Cucurbita palmata

EUPHORBIACEAE - SPURGE FAMILY
Chamaesyce albomarginata
Euphorbia incisa

FABACEAE - PEA FAMILY
Acacia greggii
Astragalus lentiginosus fremontii
Astragalus nuttallianus
Lotus humistratus
Lupinus brevicaulis
Lupinus concinnus
Hoffmanseggia glauca (densiflora)

GERANIACEAE - GERANIUM FAMILY
Erodium cicutarium

HYDROPHYLLACEAE - WATERLEAF FAMILY
Eucrypta micrantha
Phacelia distans
Phacelia fremontii
Placelia crenulata crenulata
*Phacelia vallis-mortae**

KRAMERIACEAE - KRAMERIA FAMILY
Krameria parvifolia imparata

* Plants not in flower; identification tentative

TABLE 1
(Continued)

LAMIACEAE - MINT FAMILY
Marrubium vulgare
Salazaria mexicana
Salvia columbariae columbariae
Salvia dorrii dorrii
Salvia mohavensis

LINACEAE - FLAX FAMILY
Linum lewisii
Linum puberulum

LOASACEAE - LOASA FAMILY
Mentzelia albicaulis

MALVACEAE - MALLOW FAMILY
Sphaeralcea ambigua ambigua

NYCTAGINACEAE - FOUR O'CLOCK FAMILY
Allionia incarnata
Mirabilis bigelovii
Mirabilis (Oxybaphus) coccineus
Mirabilis multiflora pubescens (froebelii)

OLEACEAE - OLIVE FAMILY
Menodora scabra
Menodora spinescens

ONAGRACEAE - EVENING PRIMROSE FAMILY
Gaura coccinea
Oenothera californica californica
*Oenothera primiveris**

PAPAVERACEAE - POPPY FAMILY
Eschscholzia mexicana

PLANTAGINACEAE - PLANTAIN FAMILY
Plantago purshii

POLEMONIACEAE - PHLOX FAMILY
Eriastrum diffusum
Eriastrum wilcoxii
Gilia aliquanta
Linanthus demissum
Linanthus dichotomus

POLYGONACEAE - BUCKWHEAT FAMILY
Centrostegia (Chorizanthe) thurberi
Eriogonum deflexum deflexum
Eriogonum fasciculatum polifoium
Eriogonum heermanii floccosum

* Plants not in flower; identification tentative

TABLE 1
(Continued)

POLYGONACEAE - BUCKWHEAT FAMILY - (Continued)
Eriogonum inflatum inflatum
Eriogonum maculatum
Eriogonum nidularium
Eriogonum palmerianum
Eriogonum pusillum
Eriogonum trichopes
Eriogonum wrightii
Rumex hymenosepalus

RANUNCULACEAE - BUTTERCUP FAMILY
Delphinium parishii

ROSACEAE - ROSE FAMILY
Coleogyne ramosissima
Fallugia paradoxa
Prunus fasciculatus fasciculatus
Purshia glandulosa

SCROPHYLARIACEAE - FIGWORT FAMILY
Castilleja chromosa
Castilleja linearifolia
Penstemon palemri
*Penstemon stephensii**

SOLALNACEAE - NIGHTSHADE FAMILY
Lycium andersonii
Lycium cooperi
Physalis hederaefolia

VERBENACEAE - VERVAIN FAMILY
Aloysia (Lippia) wrightii

ZYGOPHYLLACEAE - CALTROP FAMILY
Larrea tridentata divaricata

ANGIOSPERMAE (MONOCOTYLEDONES)

AGAVACEAE - AGAVE FAMILY
Yucca baccata
Yucca brevifolia jaegeriana
Yucca schidigera

ALLIACEAE (AMARYLLIDACEAE) - AMARYLLIS FAMILY
Dichelostemma pulchella

LILIACEAE - LILY FAMILY
Calochortus kennedyi

* Plants not in flower; identification tentative

TABLE 1
(Continued)

POACEAE - GRASS FAMILY
Aristida purpurea
*Bouteloua sp.**
Bromus rubens
Bromus tectorum
Erioneuron pulchellum
Festuca octoflora
Hilaria jamesii
Muhlenbergia porteri
Oryzopsis hymenoides
Sitanion hystrix hystrix
Stipa speciosa

GYMNOSPERMAE

CUPRESSACEAE - CYPRESS FAMILY
Juniperus osteosperma

PINACEAE - PINE FAMILY
Pinus Monophylla

EPHEDRACEAE - EPHEDRA FAMILY
Ephedra nevadensis
Ephedra veridis

* Plants not in flower; identification tentative

TABLE 2

SPECIAL INTEREST PLANTS EXPECTED TO OCCUR IN THE VICINITY OF THE CASTLE MOUNTAIN PROJECT SITE

PLANT	FWS	DFG	BLM	CNPS
Cryptantha tumulosa	C3c	--	--	4
Eriogonum heermannii var. floccosum	C3c	--	--	4
Penstemon stephensii	C2	--	--	1B

LEGEND:

FWS (U. S. Fish and Wildlife Service)
Candidate Species:
C1 -Present information supports listing as an endangered or threatened species.
C2 -Present information suggests probable appropriateness for listing as an endangered or threatened species.
Non-Candidate Species:
C3-Plants not threatened at this time.

"The taxa in Categories 1 and 2 are candidates for possible addition to the List of Endangered and Threatened Plants. The Service encourages their consideration in environmental planning,..." (USFWS, 1985).

DFG (State of California Department of Fish and Game)

X - Plants listed on the California Natural Diversity Data Base (CNDDB).

BLM (U.S. Bureau of Land Management)
X - Considered "sensitive" by BLM, includes sensitive plants within the California Desert Conservation Area.

CNPS (California Native Plant Society)
1A: Plants presumed extinct in California.
1B: Plants rare, threatened, or endangered in California and elsewhere.
2: Plants rare, threatened, or endangered in California but more common elsewhere.
3: Plants about which we need more information - a review list.
4: Plants of limited distribution - a watch list.

TABLE 2
(Continued)

Legal differences exist between "listed" "endangered" and "threatened" species, "proposed" endangered and threatened species and "Candidate" species under the provisions of the Endangered Species Act and its implementing regulations. These terms and their meanings are summarized below:

Term	Interpretation
Endangered species	A species that is in danger of extinction throughout all or a significant portion of its range.
Threatened species	A species likely to become endangered in the foreseeable future throughout all or a significant portion of its range.

The following categories are used in conjunction with the above terms and the protection afforded plants:

Term	Interpretation	Protection Afforded Plants Under ESA
"Listed" (endangered or threatened species)	A species that that has been the subject of a proposed and final rule or regulation in the Federal Register.	Fully protected. Recovery plans are required.
"Proposed" (endangered or threatened species)	A species for which a proposed regulation has been published in the Federal Register, but not a final rule.	Limited protection. Must be addressed in environmental assessments. Must confer with USFWS if likely to jeopardize the continued existence.
"Candidate" (C1 and C2) species	Species being considered for listing as an endangered or threatened species but not yet the subject of a proposed rule.	Not protected. Should be monitored for impacts.*
"Non-Candidate" (C3) species	Species previously considered and included on past lists but now excluded because they are known to be extinct (3a), they are taxinomically unvalid or not meeting the FWS definition of a "species" (3b) or are too widespread or not threatened at this time (3c).	Not protected.

* BLM policy is to take positive action to prevent the need for Candidate (C1, C2) species to be listed.

TABLE 3

AMPHIBIANS AND REPTILES OBSERVED OR EXPECTED TO OCCUR IN THE CASTLE MOUNTAIN AREA

This list represents species expected to occur in the area based on range maps (Stebbins, 1986), habitat preferences, and literature records. Species actually recorded from the area by Gould (1987) and this study are indicated by "*". Questionable species are indicated by "?".

AMPHIBIANS

Bufo punctatus, Red-spotted Toad

REPTILES

TURTLES

Gopherus agassizi, Desert Tortoise

LIZARDS

Coleonyx variegatus, Banded Gecko

Sauromalus obesus, Chuckwalla

* *Dipsosaurus dorsalis*, Desert Iguana

* *Callisaurus draconoides*, Zebra-tailed Lizard

Crotaphytus insularis, Collared Lizard

* *Gambelia wislizeni*, Leopard Lizard

* *Sceloporus magister*, Desert Spiny Lizard

* *Uta stansburiana*, Side-blotched Lizard

Urosaurus graciosus, Long-tailed Brush Lizard

* *Phrynosoma platyrhinos*, Desert Horned Lizard

Xantusia vigilis, Desert Night Lizard

* *Cnemidophorus trigris*, Western Whiptail

Heloderma suspectum, Gila Monster

TABLE 3
(Continued)

SNAKES

Leptotyphlops humilis, Western Blind Snake
Lichanura trivirgata, Rosy Boa
Phyllorhynchus decurtatus, Leaf-nosed Snake
Masticophis flagellum, Coachwhip
Masticophis taeniatus, Striped Whipsnake
Salvadora hexalepis, Western Patch-nosed Snake
Arizona elegans, Glossy Snake
Pituophis melanoleucus, Gopher Snake
Lampropeltis getulus, Common Kingsnake
Rhinocheilus lecontei, Long-nosed Snake
Sonora semiannulata, Western Ground Snake
Chinonactis occipitalis, Western Shovel-nosed Snake
? *Tantilla hobartsmithi,* Great Basin Black-headed Snake
Trimophodon lambda, Sonoran Lyre Snake
Hypsiglena torquata, Night Snake
Crotalus atrox, Western Diamondback Rattlesnake
Crotalus mitchelli, Speckled Rattlesnake
Crotalus cerastes, Sidewinder Rattlesnake
Crotalus scutulatus, Mohave Rattlesnake

TABLE 4

BIRDS OBSERVED OR EXPECTED TO OCCUR IN THE CASTLE MOUNTAIN AREA

This list includes species expected in the area based on studies in the Clark Mountains (Environmental Monitoring and Service, 1985; Miller, 1940; Soda Springs Check List, 1988) and at the Soda Springs Field Station south of Baker. Those species actually observed in the area by Gould, 1987a,b and this study are indicated by "*."

	*Cathartes aura,*Turkey Vulture
	Accipiter striatus, Sharp-shinned Hawk
	Accipiter cooperii, Cooper's Hawk
*	*Buteo jamaicensis,* Red-tailed Hawk
	Buteo swainsoni, Swainson's Hawk
*	*Aquila chrysaetos,* Golden Eagle
*	*Falco sparverius,* American Kestrel
*	*Falco mexicanus,* Prairie Falcon
*	*Callipepla gambelii,* Gambel's Quail
*	*Alectoris chukar,* Chukar
*	*Zenaida macroura,* Mourning Dove
	Geococcyx californianus, Greater Roadrunner
*	*Bubo virginianus,* Great Horned Owl
	Athene cunicularia, Burrowing Owl
	Asio otus, Long-eared Owl
*	*Tyto allba,* Barn Owl
	Chordeiles minor, Common Nighthawk
	Chordeiles acutipennis, Lesser Nighthawk
*	*Phalaenoptilus nuttallii,* Common Poorwill
	Aeronautes saxatalis, White-throated Swift
	Calypte costae, Costa's Hummingbird
	Sphyrapicus varius, Yellow-breasted Sapsucker
*	*Picoides scalaris,* Ladder-backed Woodpecker
	Colaptes auratus, Common Flicker
	Sayornis nigricans, Black Phoebe
*	*Sayornis saya,* Say's Phoebe
*	*Myiarchus cinerascens,* Ash-throated Flycatcher

TABLE 4
(Continued)

* *Tyrannus vociferans*, Cassin's Kingbird
* *Tyrannus verticalis*, Western Kingbird
* *Eremophila alpestris*, Horned Lark
Hirundo phyrrhonota, Cliff Swallo
Gymnorhinus cyanocephalus, Pinyon Jay
* *Corvus corax*, Common Raven
Auriparus flaviceps, Verdin
* *Campylorhynchus brunneicapillus*, Cactus Wren
* *Salpinctes obsoletus*, Rock Wren
Thryomanes bewickii, Bewicks Wren
* *Mimus polyglottos*, Northern Mockingbird
* *Toxostoma bendirei*, Bendires Thrasher
Toxostoma dorsale, Crissal Thrasher
Toxostoma lecontei, LeConte's Thrasher
* *Turdus migratorius*, American Robin
Regulus calendula, Ruby-crowned Kinglet
* *Polioptila melanua*, Black-tailed Gnatcatcher
Polioptila caerulea, Blue-gray Gnatcatcher
* *Lanius ludovicianus*, Loggerhead Shrike
Vireo vicinior, Gray Vireo
Vireo solitarius, Solitary Vireo
Dendroica nigrescens, Black-throated Gray Warbler
Vermivora virginiae, Virginia's Warbler
Dendroica coronate, Yellow-rumped Warbler
Oporornis tolmiei, MacGillivray's Warbler
* *Wilsonia pusilla*, Wilson's Warbler
Myioborus pictus, Painted Redstart
Piranga ludoviciana, Western Tanager
Piranga flava, Hepatic Tanager
Pheuticus melanocephalus, Black-headed Brosbeak
Zonotrichia laucophrys, White-crowned Sparrow
Junco hyemalis, Dark-eyed Junco
Spizella passerina, Chipping Sparrow
Spizella breweri, Brewer's Sparrow

TABLE 4
(Continued)

	Spizella atrogularis, Black-chinned Sparrow
*	*Amphispiza bilineata*, Black-throated Sparrow
	Amphispiza belli, Sage Sparrow
	Pooecetes gramineus, Vesper Sparrow
	Chondestes grammacus, Lark Sparrow
	Melospiza melodia, Song Sparrow
	Pipilo erythrophthalmu, Rufous-sided Towhee
*	*Pipilo chlozurus*, Green-tailed Towhee
*	*Icterus parisorum*, Scott's Oriole
	Sturnella neglecta, Western Meadowlark
	Euphagus cyanocephalus, Brewer's Blackbird
	Molothrus ater, Brown-headed Cowbird
	Carduelis psaltria, Lesser Goldfinch
*	*Carpodacus mexicanus*, House Finch
	Carpodacus purpureus, Purple Finch
	Sturnus vulgaris, European Starling

TABLE 5

LIST OF MIGRATORY AQUATIC AND WATER BIRDS
LIKELY TO BE ATTRACTED TO OPEN PONDS OF WATER
IN THE EAST MOJAVE DESERT

List based on common water and shore birds observed at the Soda Springs Field Station of the California State Universities and Colleges south of Baker, California. None of these birds would be expected to stay at the site due to the lack of food. While all migratory birds are protected or regulated, none of these are specifically State or Federally listed as Rare or Endangered:

Belted Kingfisher

American Widgeon
Blue-winged Teal
Bufflehead
Canadian Goose
Canvasback
Cinamon Teal
Common Merganser
European Widgeon
Gadwall
Green-winged Teal
Hooded Merganser
Mallard
Pintail
Ruddy Duck
Shoveler
Lesser Scaup

Black-crowned Night Heron
Cattle Egret
Common Egret
Snowy Egret
Great Blue Heron
Green Heron
Little Blue Heron

Killdeer
Greater Yellowlegs
Lesser Yellowlegs
Long-billed Dowitcher
Least Sandpiper
Spotted Sandpiper
Willet
Semipalmated Sandpiper
Northern Phalarope
Wildon's Phalarope
American Avocet
Black-necked Stilt

Ring-billed Gull

Herring Gull

Double-crested Cormorant

American Coot

White-faced Ibis

Horned Grebe
Pied-billed Grebe
Western Grebe
Earred Grebe

TABLE 6

MAMMALS OBSERVED OR EXPECTED TO OCCUR IN THE CASTLE MOUNTAIN AREA

This list is based on studies in the Clark Mountains (E.M.S., 1985), at the Soda Springs Field Station south of Baker, range maps (mostly from Ingles, 1965), habitats present, Gould, (1987 a,b) and this study. X = Known from area = (observed or reported), P = Possible in area (expected).

	HABITAT PREFERENCE			
	Creosote Bush	Joshua Tree	Black Bush	Pinyon Juniper
Macrotus californicus, California Leaf-nosed Bat	P	P		
Myotis thysanodes, Fringed Myotis		P	P	
Myotis californicus, California Myotis	P	P	P	P
Myotis subulatus, Small-footed Myotis		P	P	P
Myotis volans, Hairy-winged Myotis		P	P	P
Myotis yumanensis, Yuma Myotis		P	P	P
Lasiurus cinerius, Hoary Bat		P	P	P
Eptesicus fuscus, Big Brown Bat		P	P	P
Pipistrellus hesperus, Western Pipistrelle	P	P		
Antrozous pallidus, Pallid Bat	P	P		
Tadarida brasiliensis, Brazilian Free-tailed Bat	P	P		
Tadarida molossa, Big Free-tailed Bat		P		
Sorex merriami, Merriam Shrew	P	P	P	
Notiosorex crawfordi, Gray Shrew	P	P	P	
Lepus californicus, Black-tailed Hare	X	X	X	X
Sylvilagus auduboni, Desert Cottontail	X	X	X	X
Ammospermophilus leucurus, Antelope Ground Squirrel	X	X	X	X
Otosperophilus variegatus, Rock Squirrel		X?	X?	
Citellus Tereticaudus, Round-tailed Ground Squirrel	P			
Thomomys bottae, Botta Pocket Gopher	X	X	X	X
Perognathus longimembris, Little Pocket Mouse	P	P		
Perognathus formosus, Long-tailed Pocket Mouse	P			
Perognathus spinatus, Spiny Pocket Mouse	P	P	P	
Perognathus parvus, Great Basin Pocket Mouse		P	P	P

TABLE 6
(Continued)

	HABITAT PREFERENCE			
	Creosote Bush	Joshua Tree	Black Bush	Pinyon Juniper
Dipodomys merriami, Merriam Kangaroo Rat			X	
Dipodomy deserti, Desert Kangaroo Rat	P	P		
Reithrodontomys megalotis, Western Harvest Mouse	P	P	P	P
Peromyscus crinitis, Canyon Mouse		P	P	P
Peromyscus eremicus, Cactus Mouse	P			
Peromyscus boylii, Brush Mouse		P	P	P
Peromyscus truei, Pinyon Mouse				P
Peromyscus maniculatus, Deer Mouse	P	P	P	P
Onychomys torridus, Southern Grasshopper Mouse	P	P		
Neotoma lepida, Desert Wood Rat	X	X	X	X
Mus musculus, House Mouse			P	P
Vulpes macrotis, Kit Fox	X	X	P	
Urocyon cinereoargenteus, Gray Fox		P	P	P
Canis latrans, Coyote	X	X	X	X
Bassariscus astutus, Ringtail		P	P	P
Taxidea taxus, Badger	P	P	P	P
Spilogale putorius, Spotted Skunk	P	P	P	P
Mephitis mephitis, Striped Skunk	P	P	P	P
Lynx rufus, Bobcat	P	P	P	P
Felis concolor, Mountain Lion		P	P	P
Equus asinus, Burro	X	X	X	X
Odocoileus hemionus, Mule Deer		P	P	P
Ovis canadensis, Bighorn		X	X	X
Bos taurus, Cattle	X	X	X	X

TABLE 7

SPECIAL INTEREST WILDLIFE SPECIES EXPECTED TO OCCUR IN THE VICINITY OF THE CASTLE MOUNTAIN PROJECT SITE

The following species are afforded some protection by State or Federal listing or classification, or are listed as sensitive by the California Natural Diversity Data Base.

SPECIES	STATUS			
	FWS	BLM	DFG	CNDDB
REPTILES				
* *Gopherus agassizi*, Desert Tortoise	C2	S	P	--
Heloderma suspectum, Gila Monster	C2	S	--	--
BIRDS				
* *Aquila chrysaetos*, Golden Eagle	--	--	P	X
Buteo regalis, Ferruginous Hawk	C2	--	--	--
Buteo swainsoni, Swainson's Hawk	C2	--	--	X
* *Falco mexicanus*, Prairie Falcon	--	--	--	X
* *Toxostoma bendirei*, Bendire's Thrasher	--	--	--	X
Vireo vicinior, Gray Vireo	--	--	--	X
MAMMALS				
* *Ovis canadensis*, Bighorn Sheep	--	S	R	--
Macrotus californicus, California Leaf-nosed Bat	C2	--	--	--
Plecotus townsendii, Townsend's Big-eared Bat	C2	--	--	--

FWS - U.S. Fish and Wildlife Service
- T - Threatened
- E - Endangered
- C1 - Candidate, Category 1
- C2 - Candidate, Category 2

BLM - U.S. Bureau of Land Management
- S - Sensitive Species

DFG - California Department of Fish and Game
- P - Protected
- R - Rare

CNDDB - California Natural Diversity Database
- X -

* Observed on or in vicinity of proposed project site.

TABLE 8

BATS EXPECTED TO OCCUR IN THE VICINITY OF
THE CASTLE MOUNTAIN PROJECT SITE

FAMILY/SPECIES	COMMON NAME
Phyllostomidae	
Macrotus californicus	California Leaf-nosed Bat**
Vespertilionidae	
Myotis yumanensis	Yuma Myotis
Myotis thysanodes	Fringed Myotis
Myotis volans	Long-legged Myotis
Myotis californicus	California Myotis
Lasionycteris noctivagans	Silver-haired Bat
Pipistrellus hesperus	Western Pipistrelle
Eptesicus fuscus	Big Brown Bat
Lasiurus cinereus	Hoary Bat
Plecotus townsendii	Townsend's Big-eared Bat**
Antrozous pallidus	Pallid Bat
Molossidae	
Tadarida brasiliensis	Brazilian Free-tailed Bat

Species of Special Concern (Williams, 1986):

* Highest Priority
** Second Priority

Nomenclature follows Jones et al. (1982)

APPENDIX D
DRAFT EIS/EIR DISTRIBUTION LIST

APPENDIX D

DRAFT EIS/EIR DISTRIBUTION LIST

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APPENDIX E
PUBLIC SCOPING NOTIFICATIONS

APPENDIX E

PUBLIC SCOPING NOTIFICATIONS

APPENDIX E CONTENTS

This appendix has been prepared as a separate document. Copies are on file and available for public review at the following locations:

U.S. Bureau of Land Management (California)

Resource Area Offices

Barstow Resource Area
150 Coolwater Lane
Barstow, CA 92311
619/256-3595

El Centro Resource Area
333 South Waterman Avenue
El Centro, CA 92243
619/352-5842

Needles Resource Area
101 Spike's Road
PO Box 888
Needles, CA 92363
619/326-3896

Palm Springs Resource Area
1900 Tahquitz-McCallum Way, Suite B1
Palm Springs, CA 92262
619/323-4421

Ridgecrest Resource Area
112 Dolphin Street
Ridgecrest, CA 93555
619-375-7125

Bakersfield District
800 Truxtun Avenue, Room 302
Bakersfield, CA 93301
805/861-4191

State Office

California State Office
2800 Cottage Way, Room E-2819
Sacramento, CA 95825
916/978-4754

District Offices

California Desert District
1695 Spruce Street
Riverside, CA 92507
714/351-6394

Susanville District
705 Hall Street
PO Box 1090
Susanville, CA 96130
916/257-5381

Ukiah District
555 Leslie Street
Ukiah, CA 95482
707/462-3873

U.S. Bureau of Land Management (Nevada)

Las Vegas District Office
4765 Vegas Drive
Las Vegas, Nevada 89126
702/646-8849

County of San Bernardino

Environmental Public Works Agency
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, CA 92415-0182
714/387-4110

Libraries

Anaheim Public Library
500 West Broadway
Anaheim, CA 92805

Baker High School Library
Highway 120 and School Road
Baker, CA 92309

BLM Service Center, Bldg. 50
Library, D-553-A
P.O. Box 25047
Denver, CO 80225

Cal Poly
Library Documents Department
3801 W. Temple
Pomona, CA 91768

California State University
Fullerton Library
P.O. Box 4150
Fullerton, CA 92634

California State University
Library Documents Department
18111 Nordhoff Street
Northridge, CA 91324

Govt. Documents Dept.
University Library
University of California
Davis, CA 95616

Las Vegas Public Library
1762 East Charleston Blvd.
Las Vegas, NV 89104

Long Beach Public Library
Ocean and Pacific Avenue
Long Beach, CA 90802

Long Beach State University
Library Documents Department
6101 E. Seventh Street
Long Beach, CA 90801

Los Angeles Public Library
Documents Department
361 S. Anderson Street
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Ontario City Library
215 East "C" Street
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P.O. Box 468
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San Bernardino County Library
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Barstow, CA 92311

San Bernardino County Library
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San Bernardino County Library
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San Bernardino Public Library
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UC Berkeley
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UC Irvine
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1200 E. Colton Avenue
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University - San Francisco
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Washoe County Library
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APPENDIX F
AUTHORITY TO CONSTRUCT APPLICATION

APPENDIX F

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APPENDIX F CONTENTS

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Palm Springs Resource Area
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Ridgecrest Resource Area
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800 Truxtun Avenue, Room 302
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State Office

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2800 Cottage Way, Room E-2819
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District Offices

California Desert District
1695 Spruce Street
Riverside, CA 92507
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Susanville District
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Ukiah District
555 Leslie Street
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U.S. Bureau of Land Management (Nevada)

Las Vegas District Office
4765 Vegas Drive
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500 West Broadway
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18111 Nordhoff Street
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